

**New York State  
Department of Transportation  
Region 8**

**REGIONAL ITS ARCHITECTURE  
MASTER PLAN**



Prepared By:

***NORTHROP GRUMMAN***  
*Mission Systems*

1900 Founders Drive, Suite 102  
Kettering, OH 45420  
Phone: (937) 259-4858  
Fax: (937) 259-4885

June 2003



# TABLE OF CONTENTS

|          |  |            |
|----------|--|------------|
| <b>1</b> | <b>INTRODUCTION.....</b>                                   | <b>1-1</b> |
| 1.1      | OVERVIEW .....   | 1-1        |
| 1.2      | DOCUMENT PURPOSE .....                                     | 1-1        |
| 1.3      | DOCUMENT ORGANIZATION.....                                 | 1-2        |
| 1.4      | DEFINITION OF THE REGION.....                              | 1-2        |
| <b>2</b> | <b>OVERVIEW OF THE NATIONAL ITS ARCHITECTURE.....</b>      | <b>2-1</b> |
| 2.1      | LOGICAL ARCHITECTURE.....                                  | 2-1        |
| 2.2      | PHYSICAL ARCHITECTURE .....                                | 2-3        |
| 2.2.1    | <i>Transportation Layer</i> .....                          | 2-4        |
| 2.2.2    | <i>Communications Layer</i> .....                          | 2-4        |
| 2.3      | STANDARDS .....  | 2-5        |
| <b>3</b> | <b>REGIONAL ITS ARCHITECTURE DEVELOPMENT PROCESS.....</b>  | <b>3-1</b> |
| 3.1      | IDENTIFY AND INTERVIEW STAKEHOLDERS .....                  | 3-1        |
| 3.2      | DETERMINE MARKET PACKAGES FOR REGION.....                  | 3-2        |
| 3.3      | BUILD SYSTEMS INVENTORY FOR REGION .....                   | 3-2        |
| 3.4      | DETERMINE RELEVANT PROCESS SPECIFICATIONS FOR REGION ..... | 3-2        |
| 3.5      | DETERMINE RELEVANT ARCHITECTURE FLOWS FOR REGION .....     | 3-3        |
| 3.6      | BUILD LIST OF STANDARDS RELEVANT FOR REGION .....          | 3-3        |
| <b>4</b> | <b>REGIONAL ITS ARCHITECTURE .....</b>                     | <b>4-1</b> |
| 4.1      | TOP-LEVEL CONSISTENCIES.....                               | 4-1        |
| 4.2      | SYSTEMS INVENTORY .....                                    | 4-3        |
| 4.3      | FUNCTIONAL PROCESSES .....                                 | 4-9        |
| 4.3.1    | <i>Context</i> .....                                       | 4-11       |
| 4.3.2    | <i>Identified Requirements</i> .....                       | 4-12       |
| <b>5</b> | <b>ORGANIZATIONAL CONNECTIVITY.....</b>                    | <b>5-1</b> |

## APPENDICES

|  |   |
|--|---|
| RELEVANT PROCESS SPECIFICATION DEFINITIONS.....  | A |
| RELEVANT ARCHITECTURE FLOW DEFINITIONS.....      | B |
| ASSOCIATED STANDARDS FOR ARCHITECTURE FLOWS..... | C |
| RELEVANT MARKET PACKAGE REFERENCE DIAGRAMS.....  | D |
| ACROYNM LIST.....                                | E |

**LIST OF FIGURES**

Figure 1-1 NYSDOT Region 8 ..... 1-3  
Figure 2-1. The Nine Major Processes within the Logical Architecture ..... 2-2  
Figure 2-2. Example of Logical Architecture Functional Decomposition ..... 2-3  
Figure 2-3. Representative Logical and Physical Architecture ..... 2-4  
Figure 4-1. National ITS Physical Architecture Subsystems..... 4-1  
Figure 4-2. Region 8 Architecture Subsystems ..... 4-2

**LIST OF TABLES**

Table 3-1. Six Steps for Architecture Development..... 3-1  
Table 4-1. NYSDOT R8 Regional ITS System Inventory ..... 4-4  
Table 4-2. Relevant National ITS Market Packages for the Regional ITS..... 4-9  
Table 4-3. Relevant Pspecs – Physical Architecture Perspective.....4-12  
Table 4-4. Relevant Pspecs - Logical Architecture Perspective.....4-24

# **1 INTRODUCTION**

## **1.1 OVERVIEW**

The demand for transportation services has increased over the past few years. During this period, the public has requested safer, more efficient roadways for travel and commerce. The transportation community has responded by providing better designs for roadways and enhancements to existing roadways. Where possible, additional roadway capacity has been provided, but this is rarely economically feasible or practical. Additionally, public transit organizations have increased the capacity and capabilities of public transit systems. Planning organizations have worked diligently with transportation organizations to develop better plans for the overall multimodal transportation system. Private organizations and the media have also increased their ability to provide information to the public concerning the status of roadways and environmental travel conditions.

To maximize the efforts of these transportation and transportation related organizations, a coordination of efforts was required. In 1997, Congress passed the Transportation Equity Act for the 21st Century (TEA-21) to address the need to begin work towards regionally integrated transportation systems. One of the results of this act was to emphasize the development of Intelligent Transportation System (ITS) architectures. An ITS architecture is a framework of systems and services that will work together to increase the safety and efficiency of the roadways.

The regional ITS architecture addresses the needs of a geographical region, and provides the high level outline that functionally defines what the pieces of the system are, and the information that is exchanged between them. This architecture, or framework, will serve as a conceptual blueprint from which to design, implement, and operate the Regional ITS. It purposely does not, however, dictate a specific design for implementation. Instead, the architecture provides a common language, or framework, that designers can use to communicate during the development of the detailed design.

With an understanding of these issues, the NYSDOT and Region 8 began the task of developing ITS and the regional ITS architecture to enhance the regions transportation systems in the mid 1990s. These efforts resulted in pointed ITS deployments, planning sessions, public meetings, outreach sessions and the development of a regional ITS architecture, inclusive of the many organizations and agencies within the region.

## **1.2 DOCUMENT PURPOSE**

The primary mission of the Regional ITS is to enhance the safety and efficiency of the traveling public. To satisfy this mission, the Regional ITS Architecture will be developed using Version 4.0 of the National ITS Architecture and tailoring it to the requirements of the region. Since the National ITS Architecture employs concepts of synergy and beneficial linkages among related components, the region's ITS will benefit from these synergies as well.

This document presents a customized regional ITS architecture. It conceptually defines what the ITS will accomplish (i.e., functions) and how it will be accomplished (i.e., processes). It further describes the interactions that occur within the system, between the system and its partners (e.g., firms and agencies), and among its customers (e.g., motorists, media, etc.). Used as a planning tool, this document will present what the ITS will be capable of as it matures. Maturation will occur via planned and coordinated deployments of existing and future components for:

- Timely and efficiently detecting, verifying, and responding to highway incidents
- Disseminating appropriately detailed, timely, and accurate traffic congestion information to the traveling public

In short, this document provides a high level perspective of the Regional ITS and a definition of key elements and services of the system. With these understandings as a baseline, engineering efforts for evolving to a final design / implementation can commence.

The Regional ITS architecture is to be used as a conceptual blueprint to establish projects for implementation. As projects are defined and the implementation begins, it is possible that the needs of the Regional ITS will change somewhat from the original plan. Therefore, this Regional ITS architecture should be designated as a baseline. As modifications and future enhancements are made, this baseline should be revised to reflect the changes. Configuration control should be employed to ensure only approved changes are incorporated and to record and maintain an audit trail of revisions.

### **1.3 DOCUMENT ORGANIZATION**

Following this introductory section, Section 2 provides an overview of the National ITS Architecture. Section 3 presents an overview of the ITS architecture development process for NYSDOT Region 8. Section 4 details the Regional ITS architecture for the NYSDOT Region 8 area. Several appendices follow the main body of the document. Appendix A lists the definitions of process specifications (pspecs), while Appendix B displays the definitions of the relative architecture flows. The standards associated with the architecture flows are listed in Appendix C. Appendix D provides an ITS Market Package reference. Appendix E provides a table of acronyms for ITS and Region 8.

### **1.4 DEFINITION OF THE REGION**

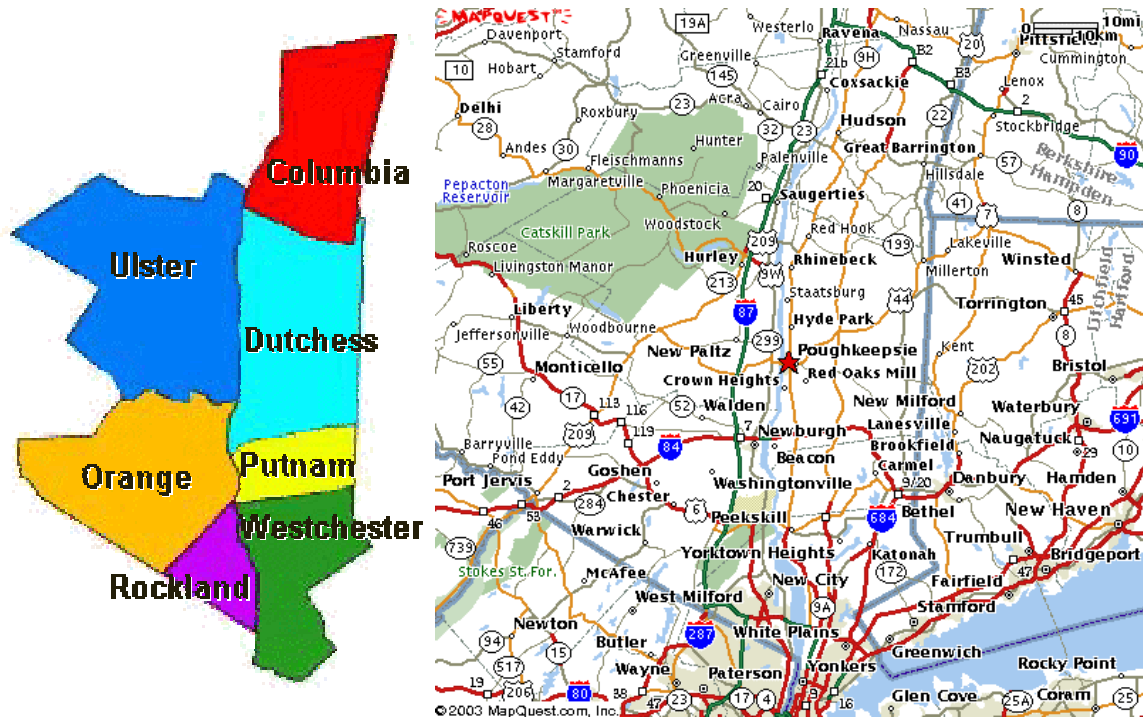
The area defined for the Regional ITS architecture is the NYSDOT Region 8 area. This area consists of seven counties in the Hudson Valley and lower Hudson Valley area. The region contains 5,696 miles of State highways and 1,124 bridges within a 4,295 square mile area.

There are 13 major cities, 75 villages, and 107 towns within the seven counties that make up Region 8. The seven counties are Columbia, Dutchess, Orange, Putnam, Rockland, Ulster, and Westchester counties.

The area is bordered to the south by New York City and NYSDOT Region 10. To the west by northern New Jersey, western Pennsylvania, and NYSDOT Region 8. To the east by Connecticut, and to the north by lower upstate New York and NYSDOT Region 1. The region has rural and urban areas. Urban areas are mainly in the southern portion of the region and rural areas dominate the northern portion. The population centers are the county seats in each of the seven counties with lower Westchester County and White Plains being the most populous area.

The main limited access roads in the region are I-87, I-287, I-684, I-84 and the 4 parkways from the New York City area on approximately a north/south path to approximately the middle of Region 8.

Figure 1-1 shows a map of the Region.



**Figure 1-1 NYSDOT Region 8**

## 2 OVERVIEW OF THE NATIONAL ITS ARCHITECTURE<sup>1</sup>

This section explains the terminology and concepts needed to understand, navigate, and use the National ITS Architecture. It also describes the functional view and the physical view of an ITS system. The functional view is called the logical architecture and the physical view is known as the physical architecture. Standards are introduced as the means for achieving an open system environment. They are based on the architecture interfaces and data flows. The following concepts and terms are explained in this section:

- Logical Architecture
- Physical Architecture
- Standards

### 2.1 LOGICAL ARCHITECTURE

A logical architecture is best described as a tool that helps organize complex entities and relationships. It focuses on the functional processes and information flows of a system. Developing a logical architecture not only helps to identify the system functions and information flows, but also guides development of functional requirements for new systems and improvements. A logical architecture should be independent of institutions and technology; that is, it should not define where or by whom functions are performed in the system, nor should it identify how functions are to be implemented.

The logical architecture of the National ITS Architecture is defined as a set of functions (or processes) and information flows (or data flows) that respond to the Market Packages described in the architecture. Processes and data flows are grouped to form particular transportation management functions (e.g., manage traffic) and are represented graphically by data flow diagrams (DFDs), or bubble charts, which decompose into several levels of detail. In these diagrams, processes are represented as bubbles and data flows as arrows. Figure 2-1 and Figure 2-2 depict simplified data flow diagrams from the National ITS Architecture documents. Note that each process (bubble) in the logical architecture describes some logical function to be performed.

For example, as shown in Figure 2-1, at the highest level of the National ITS Architecture, the “Manage Traffic” process (which includes traffic signal control functions) interacts with eight other processes.

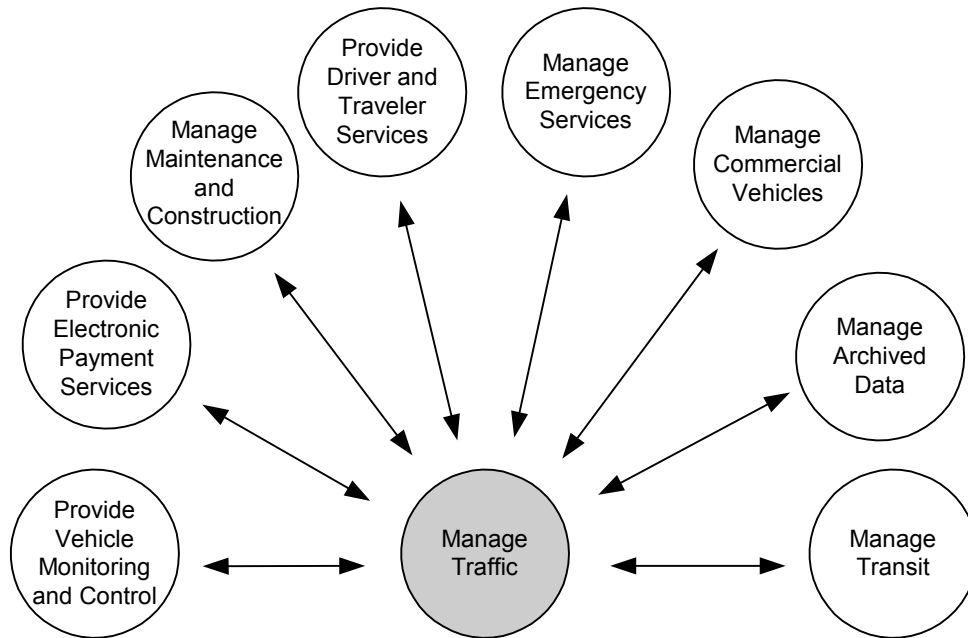
Figure 2-2 illustrates how the “Manage Traffic” process is then further broken down into six sub-processes; how one of those processes, “Provide Traffic Surveillance”, is broken down into seven sub-processes; and so on. Each of these processes is then broken down even further so that a complete functional view of a system emerges. At the lowest level of detail

---

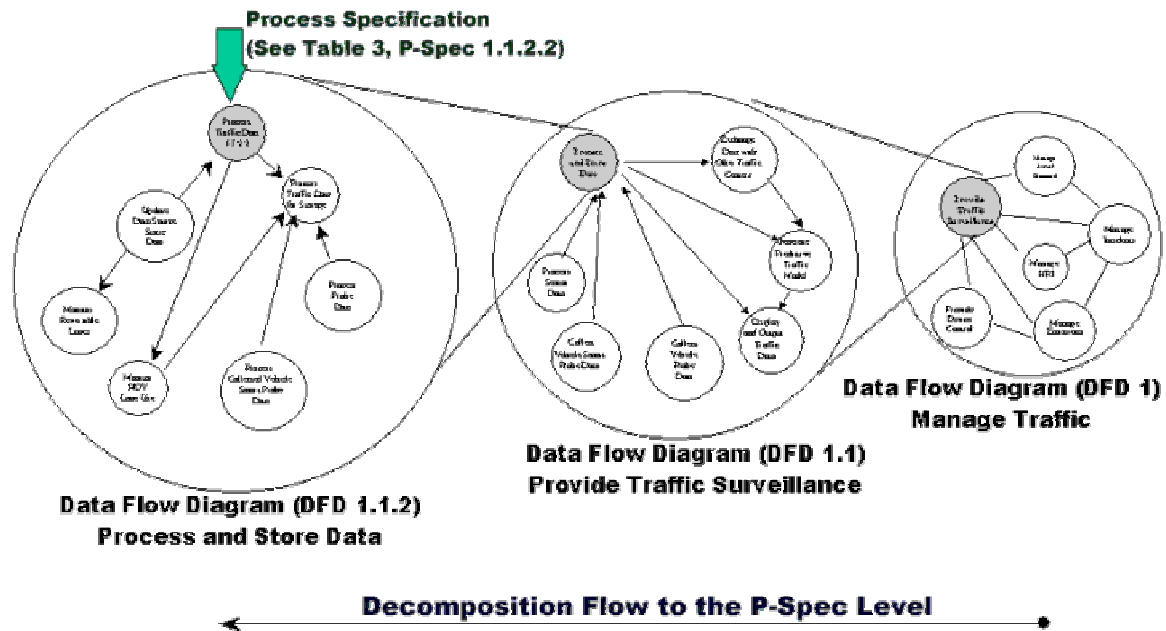
<sup>1</sup> Information from this section was taken from the *Key Concepts of the National ITS Architecture* found at <http://www.its.dot.gov/arch/arch.htm>



in the functional hierarchy are the process specifications (referred to as pspecs in the documentation). These process specifications can be thought of as the elemental functions to be performed in order to satisfy the user service requirements (i.e., they are not broken out any further). The information exchanges between processes and between pspecs are called the (logical) data flows.



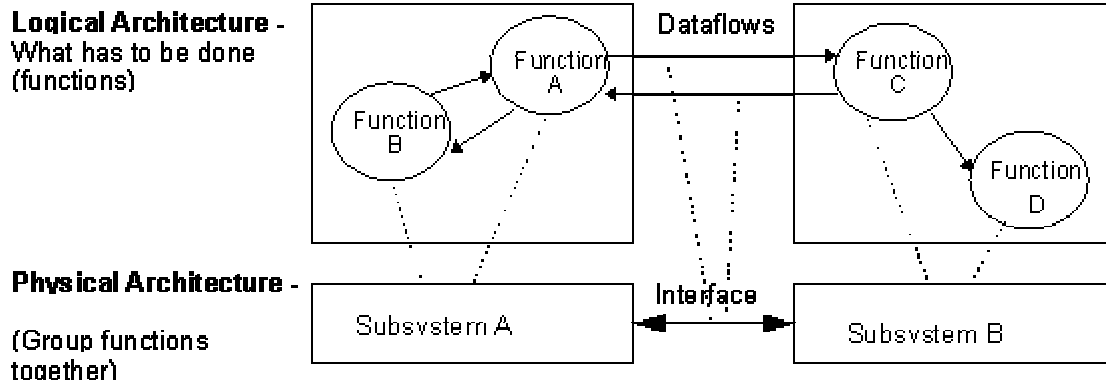
**Figure 2-1. The Nine Major Processes within the Logical Architecture**



**Figure 2-2. Example of Logical Architecture Functional Decomposition**

## 2.2 PHYSICAL ARCHITECTURE

A physical architecture is the physical (versus functional) view of a system. A physical architecture provides agencies with a physical representation (though not a detailed design) of how the system should provide the required functionality. A physical architecture takes the processes (or pspecs) identified in the logical architecture and assigns them to physical entities (called subsystems). In addition, the data flows (from the logical architecture) that originate from one subsystem and end at another are grouped together into (physical) architecture flows. In other words, one architecture flow may contain a number of more detailed data flows. These architecture flows and their communication requirements define the interfaces required between subsystems, which form the basis for much of the ongoing standards work in the ITS program. Development of a physical architecture will identify the desired communications and interactions between different transportation management organizations. Figure 2-3 depicts the relationship between the logical and physical architecture. In the National ITS Architecture, two layers describe the physical architecture: the transportation layer and the communications layer. Each of these is briefly described below.



**Figure 2-3. Representative Logical and Physical Architecture**

### 2.2.1 *Transportation Layer*

The transportation layer of the physical architecture shows the relationships among the transportation management-related elements. It is composed of subsystems for travelers, vehicles, transportation management centers, and field devices, as well as external system interfaces at the boundaries (called terminators). It may include:

- Field devices for traffic surveillance and motorist information dissemination
- Traffic signal and ramp metering controllers
- Transportation management centers
- Emergency management centers

### 2.2.2 *Communications Layer*

The communications layer of the physical architecture provides the communications services that connect the transportation layer components. This layer depicts all of the communications necessary to transfer information and data among transportation entities, traveler information and emergency service providers, and other service providers such as towing and recovery. The communications layer clearly identifies system interface points where national standards and communications protocols can be used.

Wireline communications includes the equipment necessary for the various subsystems of the architecture to exchange data to perform their transportation functions. These communications services may be provided by agency-owned communications plants (e.g., twisted pair, coaxial, fiber, or spread-spectrum radio) or may be leased from a communications service provider. It should be noted that the term "wireline communication," as used in the National ITS Architecture, refers to communication between stationary points (e.g., traffic signal control central and field equipment). In this context, wireline communication may include wireless communication systems.

## 2.3 STANDARDS

Standards are fundamental to the establishment of an open environment. Standards facilitate implementation and deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances and new approaches evolve.

Standards developed based on the architecture interfaces and data flows are continuously evolving. Several independent organizations are involved in the development of ITS standards, which allows for the overlapping of development activities. As standards are approved or published as works in progress, they provide a point of reference for effective coordination of activities when implementing ITS capabilities.

### 3 REGIONAL ITS ARCHITECTURE DEVELOPMENT PROCESS

The USDOT has published architecture development guidance documents that describe the steps to be used in developing a regional ITS architecture. The specific application of these guidelines to develop a process for developing the regional architecture for a specific region will depend on regional factors. Some factors are the breadth of organizations involved in developing the architecture, the participants familiarity and knowledge of ITS architectures, and the level of guidance from transportation governing organizations, to list a few.

The logical first step in the development of a regional ITS architecture is to determine that one is needed and to define the region. NYSDOT had previously completed these tasks along with the identification of initial stakeholders so the work of developing the regional architecture could begin.

The development process used to create the NYSDOT Region 8 Regional ITS Architecture is shown in Table 3-1. Although these steps are shown in series, each underwent several iterations to reach the desired outcome. The six steps are described in this section.

**Table 3-1. Six Steps for Architecture Development**

- |   |
|---|
| <ol style="list-style-type: none"><li>1. Identify and Interview Stakeholders</li><li>2. Determine Market Packages for region</li><li>3. Build Systems Inventory for region</li><li>4. Determine relevant Process Specifications for region</li><li>5. Determine relevant Architecture Flows for region</li><li>6. Build list of relevant Standards for region</li></ol> |
|---|

#### 3.1 IDENTIFY AND INTERVIEW STAKEHOLDERS

The first step in the development of the regional architecture is the establishment of the core stakeholder coalition - the ITS Advisory Committee. The committee is a collection of representatives for the various parties that have an interest in the future of the region. The knowledge and experiences of the committee members play a key role in the development of an ITS vision. The role of the committee is to guide the ITS planning efforts being performed to prepare the ITS Master Plan.

Prior to the Regional Architecture development project, the NYSDOT Region 8 Traffic Division had a steering committee of key partners in place to address traffic management and ITS issues in the region. The NYSP, NYSTA, NYSBA and other local transportation agencies were identified as partners to participate in the development of regional Intelligent Transportation Systems and the Regional Architecture activities.

The Region 8 leadership held many outreach meetings, training sessions and tours for the purpose of generating interest, identifying stakeholders, education and gaining support for the ITS activities being undertaken in the Region. Participating in these assorted activities were planning organizations, Police, Fire and other public safety organizations, transit agencies, Emergency Management agencies, and other transportation organizations such as NYMTC. Additionally, a number of municipal and county organizations participated including County Executives, public works, information technology and traffic/transportation departments.

Interviews (in-person, telephone, etc.) and meetings with the advisory committee members serve as the primary source for identifying current problems and defining appropriate ITS goals and objectives. The discussions provide an understanding of the impediments to the region's transportation systems operations and the relationships between agencies. In addition, ITS-related activities that are already in progress are identified. The ITS Advisory Committee members also identified other agencies whose input was critical in the development of the regional architecture. These additional contacts were interviewed using various means to provide information for the regional architecture.

### **3.2 DETERMINE MARKET PACKAGES FOR REGION**

Based upon the interviews and discussions, the initial list of Market Packages for the region is generated. As additional information is gathered and communicated to the advisory committee, a final determination is made for which market packages are to be considered as part of the regional architecture.

### **3.3 BUILD SYSTEMS INVENTORY FOR REGION**

A systems inventory is built using the notes from the stakeholder interviews and data that may already be documented in Regional ITS Plans, ITS studies, ITS Project documentation, Request For Proposals (RFPs), or any other relevant documents. The inventory items consist of identified systems (existing or planned) and the owning agency. Each item is mapped to the National ITS Architecture subsystems and terminators. The National ITS Architecture is used to identify inventory gaps and identify additional inventory items to fill the gaps.

### **3.4 DETERMINE RELEVANT PROCESS SPECIFICATIONS FOR REGION**

Develop a high-level description of the required functionality for the region. The information employed to determine what functionality is required is gathered from the systems inventory, selected market packages, and information exchanges defined by the architecture flows.

### **3.5 DETERMINE RELEVANT ARCHITECTURE FLOWS FOR REGION**

Identify and document the connections between systems in the region. This is determined by the systems inventory and the selected market packages for the region.

### **3.6 BUILD LIST OF STANDARDS RELEVANT FOR REGION**

Identify the ITS Standards that support the interfaces depicted in the regional ITS architecture. There are standards associated with several of the architecture flows in the National ITS Architecture. Standards for the exchange of information between ITS systems are important not only from an interoperability point but also from a risk and cost standpoint. Risk and Costs can be reduced using these standards since a region can select among multiple vendors for deployment products.

---

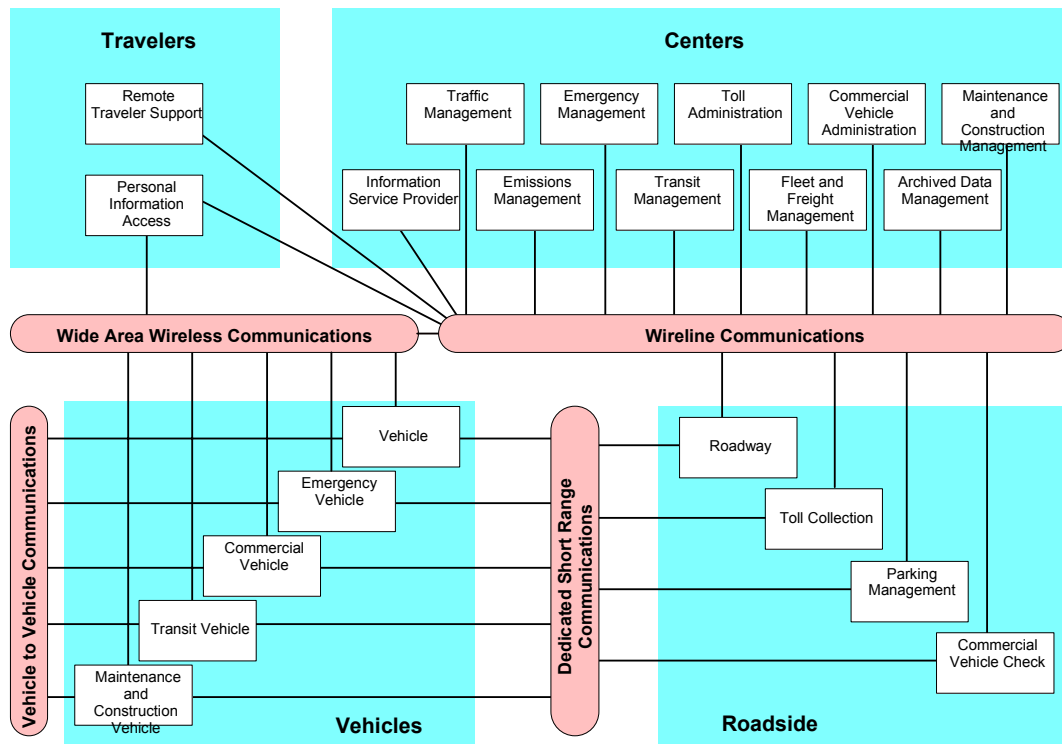


## 4 REGIONAL ITS ARCHITECTURE

### 4.1 TOP-LEVEL CONSISTENCIES

The National ITS Architecture provides a structure for the design of intelligent transportation systems. It defines the framework in which multiple design approaches can be developed; each one specifically tailored to meet the individual needs of the user, while maintaining the benefits of a structured architecture. The architecture defines the functions that must be performed to implement a given user service, the physical entities or subsystems where these functions reside, the interfaces/information flows between the physical subsystems, and the communication requirements for the information flows.

The development and deployment of the Regional ITS benefits from the National ITS Architecture standards-setting activities and modular-based concepts of system inventory identification, functional analysis, and subsystem allocation of desired ITS capabilities. The current version of the National ITS Architecture, Version 4.0 is used.

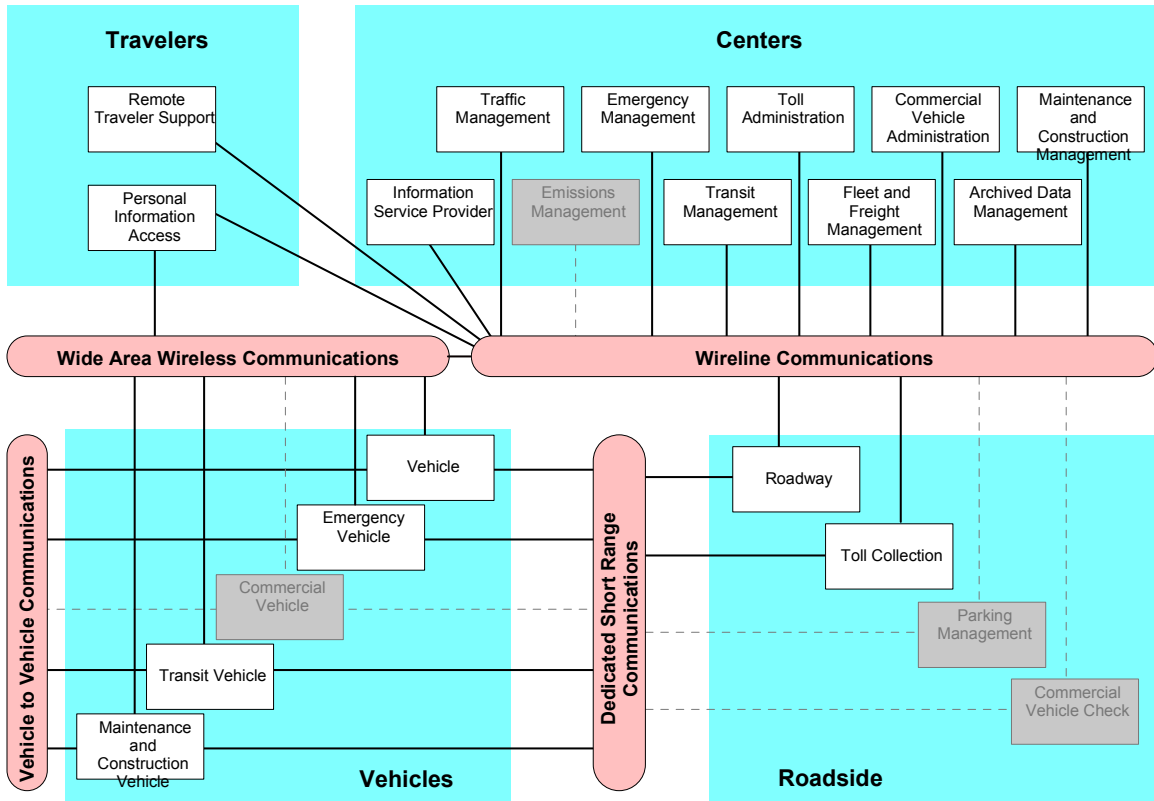


**Figure 4-1. National ITS Physical Architecture Subsystems**

Figure 4-1 illustrates the “very top level” physical architecture defined by the National ITS Architecture. This drawing depicts the various subsystems of the architecture and illustrates the communication connectivity. Detailed text descriptions of each subsystem can be found

in the *Physical Architecture* sections of the National ITS Architecture website (<http://www.iteris.com/itsarch/>).

Using the National ITS Physical Architecture as a starting point, the existing and desired functionality of the regional system is mapped to the physical architecture (Figure 4-2). This is part of an inventory process used to identify each physical entity applicable to the Regional ITS. The logical entity functional processes are presented in Section 4.3.



**Figure 4-2. Region 8 Architecture Subsystems**

## 4.2 SYSTEMS INVENTORY

The Systems Inventory maps the agencies in the NYSDOT R8 Region and their systems to the subsystems and terminators of the National ITS Architecture. Table 4-1 presents the System Inventory organized by the National ITS Architecture entity kind and type.

**Table 4-1. NYSDOT R8 Regional ITS System Inventory**

| --- CENTER SUBSYSTEMS ---               |   |
|---|---|
| Archived Data Management                | <ul style="list-style-type: none"> <li>• Bee-Line Data Management System</li> <li>• HVTMC Incident Data Archive</li> <li>• HVTMC Traffic Data Archive</li> <li>• Metro North Data Management System</li> <li>• NYSBA Toll Archive System</li> <li>• NYSDOT Maintenance Management System</li> <li>• NYSP Statewide SJS Record Management System</li> <li>• NYSTA Incident Data Archive</li> <li>• NYSTA Infrastructure Inventory and Inspection System</li> <li>• NYSTA Maintenance Management System</li> <li>• NYSTA Toll Data Storage System</li> <li>• NYSTA Traffic Data Storage and Retrieval System</li> </ul> |
| Commercial Vehicle Administration       | <ul style="list-style-type: none"> <li>• Statewide Commercial Vehicle Information Exchange Window (CVIEW)</li> </ul>  |
| Emergency Management                    | <ul style="list-style-type: none"> <li>• Local Emergency Dispatch</li> <li>• MTA Police</li> <li>• NYSP Central Communication/Dispatch</li> <li>• NYSTA Central Communications/Dispatch</li> </ul>  |
| Fleet and Freight Management            | <ul style="list-style-type: none"> <li>• Motor Carrier Systems</li> </ul>   |
| Information Service Provider            | <ul style="list-style-type: none"> <li>• HVTMC ITS Information Service Provider</li> <li>• IEN Information Exchange Network</li> <li>• IRVN Video Network</li> <li>• NYSBA ITS Information Service Provider</li> <li>• NYSTA ITS Information Service Provider</li> <li>• Other Privatized ISPs</li> <li>• SATIN (Service Area Travelers Interactive Network)</li> </ul>   |
| Maintenance and Construction Management | <ul style="list-style-type: none"> <li>• Local Maintenance and Construction</li> <li>• NYSBA Maintenance and Construction</li> <li>• NYSDOT Maintenance and Construction</li> <li>• NYSTA Maintenance and Construction</li> </ul>   |
| Toll Administration                     | <ul style="list-style-type: none"> <li>• NYSBA Toll Operations</li> <li>• NYSTA Toll Operations</li> </ul>  |
| Traffic Management                      | <ul style="list-style-type: none"> <li>• HVTMC Freeway Management System</li> <li>• NYSBA Operations Center</li> <li>• NYSBA Satellite Operations Centers</li> <li>• NYSTA Statewide Operations Center</li> <li>• NYSTA Tarrytown Equipment Hub</li> <li>• TRANSCOM Operations Information Center</li> <li>• Westchester County Signal System</li> <li>• White Plains Traffic Signal System</li> </ul>  |
| Transit Management                      | <ul style="list-style-type: none"> <li>• Bee-Line Bus Operations Dispatch System</li> <li>• City / Local Transit Operations</li> <li>• Dutchess LOOP Bus Dispatch System</li> <li>• Metro North Rail Operation Control Center</li> <li>• PART Bus System</li> <li>• Rockland TOR</li> </ul>   |

**Table 4-1. NYSDOT R8 Regional ITS System Inventory (continued...)**

| <b>--- ROADSIDE SUBSYSTEMS ---</b>   |   |
|--------------------------------------|---|
| Roadway Subsystem                    | <ul style="list-style-type: none"> <li>• Local Sensors and CCTV Equipment</li> <li>• NYSBA Sensors and CCTV Equipment</li> <li>• NYSDOT DMS and HAR Information Broadcast Equipment</li> <li>• NYSDOT RWIS Servers</li> <li>• NYSDOT Sensors and CCTV Equipment</li> <li>• NYSTA DMS and HAR Information Broadcast Equipment</li> <li>• NYSTA DSRC Equipment</li> <li>• NYSTA Sensors and CCTV Equipment</li> <li>• Portable Speed Monitoring Stations</li> <li>• TRANSCOM Sensors and CCTV Equipment</li> <li>• TRANSMIT Travel Time System</li> </ul>   |
| Toll Collection                      | <ul style="list-style-type: none"> <li>• NYSBA Toll Collection Equipment</li> <li>• NYSTA Electronic Toll Collection Equipment</li> </ul>   |
| <b>--- TRAVELER SUBSYSTEMS ---</b>   |   |
| Personal Info. Access                | <ul style="list-style-type: none"> <li>• Traveler Cellular and Land-Line Telephones</li> <li>• Traveler PC/Info. Appliance</li> </ul>   |
| Remote Traveler Support              | <ul style="list-style-type: none"> <li>• Bee-Line Bus Station Displays</li> <li>• Metro North Audio Announcement Devices</li> <li>• NYSDOT Kiosks</li> <li>• NYSTA Service Plaza Kiosks</li> <li>• Public Security Monitoring Devices</li> </ul>  |
| <b>--- VEHICLE SUBSYSTEMS ---</b>    |   |
| Emergency Vehicle Subsystem          | <ul style="list-style-type: none"> <li>• Local Emergency Vehicles (Fire, EMS, Police)</li> <li>• MTA Mobile Communications Device</li> <li>• NYSDOT HELP Trucks</li> <li>• NYSP Vehicles</li> <li>• NYSTA Troop T Vehicles</li> </ul>   |
| Maintenance and Construction Vehicle | <ul style="list-style-type: none"> <li>• Bridge Authority Maintenance Vehicles</li> <li>• Local Road Maintenance Vehicles</li> <li>• NYSDOT Road Maintenance Vehicles</li> <li>• NYSTA Road Maintenance Vehicles</li> </ul>   |
| Transit Vehicle Subsystem            | <ul style="list-style-type: none"> <li>• Bee-Line Bus Vehicles Communications Equipment</li> <li>• Bee-Line Bus Vehicles IT Equipment</li> <li>• Bee-Line Para Transit Vehicles Communications Equipment</li> <li>• Dutchess LOOP Bus Vehicles Communications Equipment</li> <li>• Dutchess LOOP Bus Vehicles IT Equipment</li> <li>• Metro North Rail Vehicles Communications Equipment</li> <li>• Metro North Rail Vehicles IT Equipment</li> <li>• PART Bus Vehicles Communications Equipment</li> <li>• PART Bus Vehicles IT Equipment</li> <li>• Rockland TOR Bus Vehicles Communications Equipment</li> <li>• Rockland TOR Bus Vehicles IT Equipment</li> </ul> |

**Table 4-1. NYSDOT R8 Regional ITS System Inventory (continued...)**

|   |  |
|---|--|
| Vehicle Subsystem                               | <ul style="list-style-type: none"> <li>• NYSBA Toll Tag Interface</li> <li>• NYSTA DSRC Receiving Equipment</li> <li>• NYSTA Toll Tag Interface</li> <li>• Privatized ISP Interface</li> <li>• System That Provides Accurate Position Information</li> <li>• TRANSMIT Probe Interface</li> </ul> |
| <b>--- “ENVIRONMENT” INTERFACE ENTITIES ---</b> |  |
| Secure Area Environment                         | <ul style="list-style-type: none"> <li>• Bee-Line Transit Stops and Stations</li> <li>• Metro North Train Stations</li> </ul>  |
| Traffic   | <ul style="list-style-type: none"> <li>• Vehicles on the Road</li> </ul>   |
| Vehicle Characteristics                         | <ul style="list-style-type: none"> <li>• Axle Spacing and Weight of Vehicles on the Road</li> </ul>  |
| <b>--- “HUMAN” INTERFACE ENTITIES ---</b>       |  |
| Archive Data Administrator                      | <ul style="list-style-type: none"> <li>• NYSBA Data Administrator</li> <li>• NYSDOT Data Administrator</li> <li>• NYSTA Data Administrator</li> </ul>  |
| Driver  | <ul style="list-style-type: none"> <li>• Driver operating a vehicle</li> </ul>   |
| Emergency Personnel                             | <ul style="list-style-type: none"> <li>• Local Emergency Personnel</li> <li>• MTA Police Department</li> <li>• NYSP State Police All Troops</li> <li>• NYSTA State Police Troop T</li> </ul>   |
| Emergency System Operator                       | <ul style="list-style-type: none"> <li>• Emergency Call 911 Operator</li> </ul>  |
| ISP Operator                                    | <ul style="list-style-type: none"> <li>• Travel and Traffic Information Operator</li> </ul>  |
| Maintenance and Construction Center Personnel   | <ul style="list-style-type: none"> <li>• Local Maintenance Personnel</li> <li>• NYSBA Maintenance Personnel</li> <li>• NYSDOT Maintenance Personnel</li> <li>• NYSTA Maintenance Personnel</li> </ul>  |
| Maintenance and Construction Field Personnel    | <ul style="list-style-type: none"> <li>• Local Maintenance Field Personnel</li> <li>• NYSBA Maintenance Field Personnel</li> <li>• NYSDOT Maintenance Field Personnel</li> <li>• NYSTA Maintenance Field Personnel</li> </ul>  |
| Pedestrians                                     | <ul style="list-style-type: none"> <li>• Individuals Using Crossing Signals</li> </ul>   |
| Toll Administrator                              | <ul style="list-style-type: none"> <li>• NYSBA Toll Controller</li> <li>• NYSTA Toll Controller</li> </ul>   |
| Toll Operator                                   | <ul style="list-style-type: none"> <li>• Bridge Authority Toll Collector / Supervisor</li> <li>• NYSTA Toll Collector / Supervisor</li> </ul>  |
| Traffic Operations Personnel                    | <ul style="list-style-type: none"> <li>• HVTMC Freeway Management System Operators</li> <li>• NYSTA Statewide Operations Center Operators</li> </ul>   |
| Transit Driver                                  | <ul style="list-style-type: none"> <li>• Bee-Line Bus Driver</li> <li>• Dutchess LOOP Bus Driver</li> <li>• Metro North Train Engineers</li> <li>• PART Bus Driver</li> <li>• Rockland TOR Bus Driver</li> </ul>   |
| Transit Fleet Manager                           | <ul style="list-style-type: none"> <li>• Bee-Line Fleet Operations Manager</li> <li>• Dutchess LOOP Bus Fleet Operations Manager</li> <li>• Metro North Fleet Operations Manager</li> <li>• PART Bus Fleet Operations Manager</li> <li>• Rockland TOR Bus Fleet Operations Manager</li> </ul>    |

**Table 4-1. NYSDOT R8 Regional ITS System Inventory (continued...)**

|  |   |
|--|---|
| Transit Maintenance Personnel  | <ul style="list-style-type: none"> <li>• Bee-Line Vehicle Maintenance Crew</li> <li>• Dutchess LOOP Bus Vehicle Maintenance Crew</li> <li>• Metro North Equipment Maintenance Crew</li> <li>• PART Bus Vehicle Maintenance Crew</li> <li>• Rockland TOR Bus Vehicle Maintenance Crew</li> </ul>   |
| Transit System Operators   | <ul style="list-style-type: none"> <li>• Bee-Line Transit Operators (Day-to-Day Activity Managers)</li> <li>• Dutchess LOOP Transit Operators (Day-to-Day Activity Managers)</li> <li>• Metro North Superintendent of Operations Services (Day-to-Day Activity Managers)</li> <li>• PART Transit Operators (Day-to-Day Activity Managers)</li> <li>• Rockland TOR Transit Operators (Day-to-Day Activity Managers)</li> </ul> |
| Transit User   | <ul style="list-style-type: none"> <li>• Individual Using Transportation Services</li> </ul>  |
| Traveler   | <ul style="list-style-type: none"> <li>• Pre-Trip Individual Using Transportation Services</li> </ul>   |
| <b>--- "OTHER SYSTEM" INTERFACE ENTITIES ---</b>                                     |   |
| Other Roadway  | <ul style="list-style-type: none"> <li>• Sensor to Sensor Communication Devices</li> </ul>  |
| Other TM   | <ul style="list-style-type: none"> <li>• Other DOTs TMCs in CT &amp; NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops)</li> <li>• Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)</li> </ul>  |
| <b>--- "SYSTEM" INTERFACE ENTITIES ---</b>   |   |
| Archived Data User Systems   | <ul style="list-style-type: none"> <li>• Academic / Research Organizations</li> <li>• HVTMC Freeway Management System Archive Access</li> <li>• Transit Planners</li> <li>• Transportation Planners</li> </ul>  |
| Basic Maintenance and Construction Vehicle<br>Basic Transit Vehicle<br>Basic Vehicle | <ul style="list-style-type: none"> <li>• Non ITS Equipment Monitoring</li> <li>• Transit fare Collection Equipment</li> <li>• Device That Reads Vehicle Measures</li> <li>• Individual Vehicle Car Radio / CB-Radio</li> </ul>  |
| Care Facility<br>CVO Information   | <ul style="list-style-type: none"> <li>• Hospital/Care Facility Information System</li> <li>• Statewide CVO Information Exchange Network</li> </ul>   |
| DMV  | <ul style="list-style-type: none"> <li>• Vehicle Title and Registration Division</li> </ul>   |
| Emergency Telecommunications System  | <ul style="list-style-type: none"> <li>• Emergency Call 911 PSAP</li> </ul>   |
| Enforcement Agency   | <ul style="list-style-type: none"> <li>• NYSP</li> </ul>  |
| Equipment Repair Facility  | <ul style="list-style-type: none"> <li>• Local Maintenance Facility</li> <li>• NYSBA Maintenance Facility</li> <li>• NYSDOT Maintenance Facility</li> <li>• NYSTA Maintenance Facility</li> </ul>   |
| Event Promoters  | <ul style="list-style-type: none"> <li>• Special Event Sponsors and Promoters</li> </ul>  |
| Financial Institution  | <ul style="list-style-type: none"> <li>• Commercial Bank</li> </ul>   |
| Government Reporting Systems   | <ul style="list-style-type: none"> <li>• Government Reporting Systems</li> </ul>  |
| Location Data Source   | <ul style="list-style-type: none"> <li>• Device That Provides Accurate Position Information</li> </ul>  |
| Maintenance and Construction Administrative Systems                                  | <ul style="list-style-type: none"> <li>• NYSDOT MAMIS System</li> </ul>   |

**Table 4-1. NYSDOT R8 Regional ITS System Inventory (continued...)**

|  |   |
|--|---|
| Map Update Provider                        | <ul style="list-style-type: none"> <li>• NYSDOT Map Update Provider</li> <li>• NYSP Map Update Provider</li> <li>• NYSTA Map Update Provider</li> <li>• Transit Map Update Provider</li> </ul>                |
| Media                                      | <ul style="list-style-type: none"> <li>• Media Traffic and Travel Information System</li> </ul>   |
| Multimodal Transportation Service Provider | <ul style="list-style-type: none"> <li>• Ferrys, Airports etc Information System</li> </ul>   |
| Rail Operations                            | <ul style="list-style-type: none"> <li>• Metro North Rail Operations</li> </ul>   |
| Storage Facility                           | <ul style="list-style-type: none"> <li>• Local Maint. Storage Facility</li> <li>• NYSBA Maint. Storage Facility</li> <li>• NYSDOT Maint. Storage Facility</li> <li>• NYSTA Maint. Storage Facility</li> </ul> |
| Surface Transportation Weather Service     | <ul style="list-style-type: none"> <li>• NYSDOT Street Surface Weather Condition Modeling System</li> <li>• NYSTA Street Surface Weather Condition Modeling System</li> </ul>                                 |
| Traveler Card                              | <ul style="list-style-type: none"> <li>• Transponder Card (EZPass)</li> </ul>   |
| Wayside Equipment                          | <ul style="list-style-type: none"> <li>• Railroad Grade Crossing Activation Equipment</li> </ul>  |
| Weather Service                            | <ul style="list-style-type: none"> <li>• Weather Network Subscription</li> </ul>  |
| Yellow Pages Service Providers             | <ul style="list-style-type: none"> <li>• Tourist Information Provider Systems</li> </ul>  |



### 4.3 FUNCTIONAL PROCESSES

The Regional ITS user requirements were mapped to the National ITS Architecture’s functional “Market Packages” to provide links to the National ITS Architecture’s “top level” service options tailored to fit real world transportation needs. Of the 75 packages that form the architecture, the following 44, listed in Table 4-2, were selected to be used in the Regional ITS Architecture.

When combined with the Regional ITS systems inventory listed in Table 4-1, a set of relevant functional processes was generated for each physical subsystem entity. These have been documented in the following paragraphs, and can assist project engineers in designing and developing each element’s operations.

**Table 4-2. Relevant National ITS Market Packages for the Regional ITS**

|                                 |  |
|---------------------------------|--|
| <u>Archived Data Management</u> | <ul style="list-style-type: none"> <li>• AD1-ITS Data Mart</li> <li>• AD2-ITS Data Warehouse</li> </ul>  |
| <u>Public Transportation</u>    | <ul style="list-style-type: none"> <li>• APTS1-Transit Vehicle Tracking</li> <li>• APTS2-Transit Fixed-Route Operations</li> <li>• APTS3-Demand Response Transit Operations</li> <li>• APTS4-Transit Passenger and Fare Management</li> <li>• APTS5-Transit Security</li> <li>• APTS6-Transit Maintenance</li> <li>• APTS7-Multi-modal Coordination</li> <li>• APTS8-Transit Traveler Information</li> </ul>   |
| <u>Traveler Information</u>     | <ul style="list-style-type: none"> <li>• ATIS1-Broadcast Traveler Information</li> <li>• ATIS2-Interactive Traveler Information</li> <li>• ATIS5-ISP Based Route Guidance</li> <li>• ATIS6-Integrated Transportation Management/Route Guidance</li> <li>• ATIS7-Yellow Pages and Reservation</li> <li>• ATIS9-In Vehicle Signing</li> </ul>  |
| <u>Traffic Management</u>       | <ul style="list-style-type: none"> <li>• ATMS01-Network Surveillance</li> <li>• ATMS02-Probe Surveillance</li> <li>• ATMS03-Surface Street Control</li> <li>• ATMS04-Freeway Control</li> <li>• ATMS06-Traffic Information Dissemination</li> <li>• ATMS07-Regional Traffic Control</li> <li>• ATMS08-Incident Management System</li> <li>• ATMS09-Traffic Forecast and Demand Management</li> <li>• ATMS10-Electronic Toll Collection</li> <li>• ATMS13-Standard Railroad Grade Crossing</li> </ul> |

**Table 4-2. Relevant National ITS Market Packages for the Regional ITS (cont.)**

|  |  |
|--|--|
|  | <ul style="list-style-type: none"><li>• ATMS14-Advanced Railroad Grade Crossing</li><li>• ATMS15-Railroad Operations Coordination</li><li>• ATMS18-Reversible Lane Management</li><li>• ATMS19-Speed Monitoring</li></ul>  |
| <u>Commercial Vehicle Operations</u>             | <ul style="list-style-type: none"><li>• CVO10-HAZMAT Management</li></ul>  |
| <u>Emergency Management</u>                      | <ul style="list-style-type: none"><li>• EM1-Emergency Response</li><li>• EM2-Emergency Routing</li><li>• EM3-Mayday Support</li><li>• EM4-Roadway Service Patrols</li></ul>  |
| <u>Maintenance &amp; Construction Management</u> | <ul style="list-style-type: none"><li>• MC01-Maintenance and Construction Vehicle Tracking</li><li>• MC02-Maintenance and Construction Vehicle Maintenance</li><li>• MC03-Road Weather Data Collection</li><li>• MC04-Weather Information Processing and Distribution</li><li>• MC06-Winter Maintenance</li><li>• MC07-Roadway Maintenance and Construction</li><li>• MC08-Work Zone Management</li><li>• MC09-Work Zone Safety Monitoring</li><li>• MC10-Maintenance and Construction Activity Coordination</li></ul> |

### 4.3.1 Context

The National ITS Architecture program defines nine major functional areas for organizing ITS projects and providing context for system planners, designers, and analyzers. They are as follows:

1. Manage Traffic
2. Manage Commercial Vehicles
3. Provide Vehicle Monitoring and Control
4. Manage Transit
5. Manage Emergency Services
6. Provide Driver and Traveler Services
7. Provide Electronic Payment Services
8. Manage Archived Data
9. Manage Maintenance and Construction

The National ITS Architecture Program further divides each of these functional areas into more specific subcategories. For example, the “Manage Traffic” category is decomposed by the architecture into the following six subcategories:

- 1.1 Provide Traffic Surveillance
- 1.2 Provide Device Control
- 1.3 Manage Incidents
- 1.4 Manage Travel Demand
- 1.5 Manage Emissions
- 1.6 Manage Highway Rail Intersections

These second-level subcategories are divided by the National ITS Architecture Program into third-level subcategories with even greater detail. For example, the “Manage Incidents” subcategory decomposes into the following seven subcategories:

- 1.3.1 Traffic Data Analysis for Incidents
- 1.3.2 Review and Manage Incident Data
- 1.3.3 Respond to Current Incidents
- 1.3.4 Provide Operator Interfaces for Incidents
- 1.3.5 Manage Possible Predetermined Responses Store
- 1.3.6 Manage Predetermined Incident Response Data
- 1.3.7 Analyze Incident Response Log

When this decomposition of each category and subcategory into finer and finer details is completed, the resulting final level of detail is called a “Process Specification” (pspec). A total 450 pspecs are defined for all areas of the National ITS Architecture. Each pspec not only represents unique and completely defined sets of actions to be implemented, but each pspec includes defined sets of corresponding data elements for enabling interoperability between the various pspecs. This is especially important when new processes are added in

the future and when exchanging data with other ITS centers. However, pspecs have only been included as a consistent path for designing and implementing individual projects. Accordingly, it will be the responsibility of the designer / implementer to provide the more intricate details of operations.

#### 4.3.2 Identified Requirements

The following paragraphs itemize the 329 pspecs identified for the NYSDOT Region 8 Regional ITS.

Table 4-3 contains a listing of the pspecs as seen from the physical architecture perspective to represent the functionality that exists within each subsystem. The identification number listed with each pspec corresponds to a standard numbering scheme that is used by the National ITS Architecture Program. Detailed definitions and associated additional “requirements” for each pspec are included in Appendix A.

**Table 4-3. Relevant Pspecs – Physical Architecture Perspective**

| Archived Data Management Subsystem            |       |
|---|-------|
| Get Archive Data                              | 8.1   |
| Manage Archive                                | 8.2   |
| Manage Archive Data Administrator Interface   | 8.3   |
| Process Archived Data User System Requests    | 8.5   |
| Analyze Archive                               | 8.6   |
| Process On Demand Archive Requests            | 8.7   |
| Prepare Government Reporting Inputs           | 8.8   |
| Manage Roadside Data Collection               | 8.9   |
| Emergency Management Subsystem                |       |
| Identify Emergencies from Inputs              | 5.1.1 |
| Determine Coordinated Response Plan           | 5.1.2 |
| Communicate Emergency Status                  | 5.1.3 |
| Manage Emergency Response                     | 5.1.4 |
| Manage Emergency Service Allocation Store     | 5.1.5 |
| Process Mayday Messages                       | 5.1.6 |
| Provide Operator Interface for Emergency Data | 5.2   |
| Select Response Mode                          | 5.3.1 |

**Table 4-3. Relevant Specs – Physical Architecture Perspective (continued)**

|   |         |
|---|---------|
| Dispatch Vehicle  | 5.3.2   |
| Assess Response Status                                      | 5.3.4   |
| Maintain Vehicle Status                                     | 5.3.6   |
| Provide Emergency Vehicle Route                             | 5.3.7   |
| Update Emergency Display Map Data                           | 5.5     |
| Manage Emergency Services Data                              | 5.6     |
| <b>Emergency Vehicle Subsystem</b>                          |         |
| Track Vehicle   | 5.3.3   |
| Provide Emergency Personnel Interface                       | 5.3.5   |
| <b>Information Service Provider Subsystem</b>               |         |
| Provide Media System Traffic Data Interface                 | 1.1.4.5 |
| Provide Traffic Data Retrieval Interface                    | 1.1.4.6 |
| Provide Transit Operations Data Distribution Interface      | 4.1.8   |
| Provide Trip Planning Information to Traveler               | 6.1.1   |
| Confirm Traveler's Trip Plan                                | 6.1.2   |
| Manage Multimodal Service Provider Interface                | 6.1.3   |
| Provide ISP Operator Interface for Trip Planning Parameters | 6.1.4   |
| Collect Service Requests and Confirmation for Archive       | 6.1.5   |
| Manage Traveler Info Archive Data                           | 6.1.6   |
| Collect Traffic Data for Advisory Messages                  | 6.2.1.1 |
| Provide Traffic and Transit Advisory Messages               | 6.2.1.2 |
| Collect Transit Data for Advisory Messages                  | 6.2.1.3 |
| Provide Traffic and Transit Broadcast Messages              | 6.2.1.4 |
| Provide ISP Operator Broadcast Parameters Interface         | 6.2.1.5 |
| Collect Environmental Probe Data                            | 6.2.1.6 |
| Collect Yellow Pages Data                                   | 6.2.4   |
| Provide Yellow Pages Data and Reservations                  | 6.2.6   |
| <b>Information Service Provider Subsystem</b>               |         |
| Collect and Update Traveler Information                     | 6.5.1   |
| Provide Traveler Yellow Pages Information and Reservations  | 6.5.2   |
| Register Yellow Pages Service Providers                     | 6.5.3   |

**Table 4-3. Relevant Specs – Physical Architecture Perspective (continued)**

|  |         |
|--|---------|
| Provide Traveler Event Information                       | 6.5.4   |
| Provide Multimodal Route Selection                       | 6.6.1   |
| Calculate Vehicle Route                                  | 6.6.2.1 |
| Provide Vehicle Route Calculation Data                   | 6.6.2.2 |
| Provide Route Segment Data for Other Areas               | 6.6.2.3 |
| Update Vehicle Route Selection Map Data                  | 6.6.2.4 |
| Provide ISP Operator Route Parameters Interface          | 6.6.2.5 |
| Calculate Vehicle Probe Data for Guidance                | 6.6.2.6 |
| Update Other Routes Selection Map Data                   | 6.6.3   |
| Select Transit Route                                     | 6.6.4   |
| Select Other Routes                                      | 6.6.5   |
| Distribute Advanced Charges and Fares                    | 7.1.6   |
| Distribute Advanced Tolls and Fares                      | 7.2.6   |
| Distribute Advanced Tolls and Parking Lot Charges        | 7.3.2   |
| Process Yellow Pages Services Provider Payments          | 7.4.1.2 |
| Process Driver Map Update Payments                       | 7.4.1.3 |
| Process Traveler Map Update Payments                     | 7.4.1.4 |
| Process Traveler Trip and Other Services Payments        | 7.4.1.6 |
| Collect Payment Transaction Records                      | 7.4.1.7 |
| Collect Price Data for ITS Use                           | 7.4.2   |
| Route Traveler Advanced Payments                         | 7.4.3   |
| <b>Maintenance and Construction Management Subsystem</b> |         |
| Track M&C Vehicles and Equipment                         | 9.1.3   |
| Manage M&C Vehicle Fleet                                 | 9.1.4   |
| Schedule M&C Vehicle Maint                               | 9.1.5   |
| Process Road Network Information                         | 9.1.7   |
| Schedule M&C Activities                                  | 9.2.1   |
| Status Current M&C Activities                            | 9.2.2   |
| Determine Winter Roadway Treatment Needs                 | 9.2.3.1 |
| Determine Roadway M&C Needs                              | 9.2.3.2 |

**Table 4-3. Relevant Specs – Physical Architecture Perspective (continued)**

|  |           |
|--|-----------|
| Provide Maintenance Decision Support                   | 9.2.3.3   |
| Manage M&C Resource Needs                              | 9.2.3.4   |
| Collect Roadside Equipment Status                      | 9.2.3.5   |
| Manage M&C Map Data                                    | 9.2.4     |
| Provide M&C Center Personnel Interface for Maint       | 9.2.5     |
| Operate Infrastructure Monitoring Devices              | 9.2.6.3   |
| Manage M&C Archive Data                                | 9.2.7     |
| Manage M&C Materials                                   | 9.2.8     |
| Operate Work Zone Devices                              | 9.3.1.1   |
| Collect Work Zone Data                                 | 9.3.2.2   |
| Generate Work Zone Information for Distribution        | 9.3.2.3   |
| Monitor Vehicle Speed in Work Zone                     | 9.3.3.2   |
| Collect Environmental Data                             | 9.4.2     |
| Process Environmental Data                             | 9.4.3     |
| Disseminate Environmental Information                  | 9.4.4     |
| Provide M&C Center Personnel Interface for Environment | 9.4.5     |
| <b>Maintenance and Construction Vehicle Subsystem</b>  |           |
| Manage M&C Systems On-Board                            | 9.1.1     |
| Collect M&C Vehicle Data On-Board                      | 9.1.2     |
| Provide M&C Vehicle Operator Interface for Maint       | 9.1.6     |
| Operate WZ Devices On-Board                            | 9.3.1.2   |
| Monitor Crew Movement On-Board                         | 9.3.1.4   |
| Status Work Zone Activity                              | 9.3.2.1   |
| Provide M&C Field Personnel Interface for Work Zones   | 9.3.2.4   |
| Detect Work Zone Intrusion On-Board                    | 9.3.4.3   |
| Provide On-Board Work Zone Intrusion Alert             | 9.3.4.4   |
| <b>Personal Information Access Subsystem</b>           |           |
| Determine Personal Portable Device Guidance Method     | 6.8.1.1.1 |
| Provide Personal Portable Device Dynamic Guidance      | 6.8.1.1.2 |
| Provide Personal Portable Device Guidance Interface    | 6.8.1.2   |

**Table 4-3. Relevant Specs – Physical Architecture Perspective (continued)**

|  |         |
|--|---------|
| Process Personal Portable Device Location Data         | 6.8.1.3 |
| Update Traveler Navigable Map Database                 | 6.8.1.4 |
| Provide Traveler Emergency Message Interface           | 6.8.1.5 |
| Build Traveler Personal Security Message               | 6.8.2.1 |
| Provide Traveler Emergency Communications Function     | 6.8.2.2 |
| Get Traveler Personal Request                          | 6.8.3.1 |
| Provide Traveler with Personal Travel Information      | 6.8.3.2 |
| Provide Traveler Personal Interface                    | 6.8.3.3 |
| Provide Personal Traveler Card Interface               | 7.5.3   |
| <b>Remote Traveler Support Subsystem</b>               |         |
| Provide Transit User Roadside & Vehicle Data Interface | 4.7.1   |
| Detect Transit User at Roadside                        | 4.7.2.1 |
| Determine Transit User Needs at Roadside               | 4.7.2.2 |
| Determine Transit Fare at Roadside                     | 4.7.2.3 |
| Manage Transit Fare Billing at Roadside                | 4.7.2.4 |
| Provide Transit User Roadside Fare Interface           | 4.7.2.5 |
| Update Roadside Transit Fare Data                      | 4.7.2.6 |
| Provide Transit Roadside Passenger Data                | 4.7.2.7 |
| Monitor Secure Area                                    | 5.1.7.1 |
| Manage Secure Area Security                            | 5.1.7.2 |
| Report Traveler Emergencies                            | 5.1.7.3 |
| Get Traveler Request                                   | 6.3.1   |
| Inform Traveler  | 6.3.2   |
| Provide Traveler Kiosk Interface                       | 6.3.3   |
| Update Traveler Display Map Data at Kiosk              | 6.3.4   |
| Provide Remote Terminal Traveler Card Interface        | 7.3.4   |
| Provide Transit User Roadside Traveler Card Interface  | 7.5.2   |
| Provide Traveler Kiosk Traveler Card Interface         | 7.5.4   |
| <b>Roadway Subsystem</b>                               |         |
| Process Traffic Sensor Data                            | 1.1.1.1 |



**Table 4-3. Relevant Specs – Physical Architecture Perspective (continued)**

|   |           |
|---|-----------|
| Process Environmental Sensor Data                 | 1.1.1.3   |
| Manage Data Collection and Monitoring             | 1.1.1.4   |
| Provide Sensor Interface to Other Roadway Devices | 1.1.1.5   |
| Collect Infrastructure Sensor Data                | 1.1.1.6   |
| Collect Vehicle Probe Data                        | 1.1.6     |
| Process Indicator Output Data for Roads           | 1.2.7.1   |
| Monitor Roadside Equipment Operation for Faults   | 1.2.7.2   |
| Manage Indicator Preemptions                      | 1.2.7.3   |
| Process In-vehicle Signage Data                   | 1.2.7.4   |
| Process Indicator Output Data for Freeways        | 1.2.7.5   |
| Provide Device Interface to Other Roadway Devices | 1.2.7.8   |
| Process Roadway Information Data                  | 1.2.7.9   |
| Process Traffic Images                            | 1.3.1.3   |
| Detect Roadway Events                             | 1.6.1.1   |
| Control HRI Traffic Signals                       | 1.6.1.2.1 |
| Control HRI Warnings and Barriers                 | 1.6.1.2.2 |
| Provide SSR Device Controls                       | 1.6.1.2.3 |
| Provide HSR Device Controls                       | 1.6.1.2.4 |
| Manage Device Control                             | 1.6.1.2.5 |
| Maintain Device State                             | 1.6.1.2.6 |
| Perform Equipment Self-Test                       | 1.6.1.3   |
| Generate Alerts and Advisories                    | 1.6.1.4.1 |
| Provide Closure Parameters                        | 1.6.1.4.2 |
| Report Alerts and Advisories                      | 1.6.1.4.3 |
| Report HRI Status on Approach                     | 1.6.1.4.4 |
| Detect HRI Hazards                                | 1.6.1.5   |
| Close HRI on Detection                            | 1.6.1.6.1 |
| Detect Imminent Vehicle/Train Collision           | 1.6.1.6.2 |
| Control Traffic Volume at Active HRI              | 1.6.1.7.1 |
| Close HRI on Command                              | 1.6.1.7.2 |

**Table 4-3. Relevant Specs – Physical Architecture Perspective (continued)**

|  |          |
|--|----------|
| Interact with Wayside Systems                | 1.6.3.1  |
| Advise and Protect Train Crews               | 1.6.3.2  |
| Provide ATS Alerts                           | 1.6.3.3  |
| Provide Interactive Interface                | 1.6.5.1  |
| Determine HRI Status                         | 1.6.5.2  |
| Maintain HRI Closure Data                    | 1.6.5.3  |
| Monitor Crew Movement                        | 9.3.1.3  |
| Collect Vehicle Speed                        | 9.3.3.1  |
| Support Vehicle Speed Enforcement            | 9.3.3.4  |
| Detect Work Zone Intrusion                   | 9.3.4.1  |
| Provide Work Zone Intrusion Alert            | 9.3.4.2  |
| <b>Toll Administration</b>                   |          |
| Process Violations for Tolls                 | 5.4.2    |
| Manage Toll Archive Data                     | 7.1.1.11 |
| Manage Bad Toll Payment Data                 | 7.1.1.3  |
| Collect Probe Data From Toll Transactions    | 7.1.1.6  |
| Update Toll Price Data                       | 7.1.1.7  |
| Register for Advanced Toll Payment           | 7.1.1.8  |
| Manage Toll Financial Processing             | 7.1.1.9  |
| Exchange Data with Other Toll Administration | 7.1.8    |
| <b>Toll Collection</b>                       |          |
| Read Tag Data for Tolls                      | 7.1.1.1  |
| Determine Advanced Toll Bill                 | 7.1.1.10 |
| Calculate Vehicle Toll                       | 7.1.1.2  |
| Check for Advanced Tolls Payment             | 7.1.1.4  |
| Bill Driver for Tolls                        | 7.1.1.5  |
| Produce Roadside Displays                    | 7.1.2    |
| Obtain Toll Violator Image                   | 7.1.3    |
| Detect Vehicle for Tolls                     | 7.1.5    |

**Table 4-3. Relevant Specs – Physical Architecture Perspective (continued)**

| Traffic Management Subsystem                                   |         |
|--|---------|
| Collect and Process Sensor Fault Data                          | 1.1.1.2 |
| Process Traffic Data for Storage                               | 1.1.2.1 |
| Process Traffic Data   | 1.1.2.2 |
| Update Data Source Static Data                                 | 1.1.2.3 |
| Process Probe Data   | 1.1.2.5 |
| Monitor Reversible Lanes                                       | 1.1.2.7 |
| Generate Predictive Traffic Model                              | 1.1.3   |
| Retrieve Traffic Data  | 1.1.4.1 |
| Provide Traffic Operations Personnel Traffic Data Interface    | 1.1.4.2 |
| Provide Direct Media Traffic Data Interface                    | 1.1.4.3 |
| Update Traffic Display Map Data                                | 1.1.4.4 |
| Manage Traffic Archive Data                                    | 1.1.4.7 |
| Exchange data with Other Traffic Centers                       | 1.1.5   |
| Select Strategy  | 1.2.1   |
| Determine Indicator State for Freeway Management               | 1.2.2.1 |
| Determine Indicator State for Road Management                  | 1.2.2.2 |
| Output Control Data for Roads                                  | 1.2.4.1 |
| Output Control Data for Freeways                               | 1.2.4.2 |
| Output In-vehicle Signage Data                                 | 1.2.4.3 |
| Output Roadway Information Data                                | 1.2.4.4 |
| Maintain Traffic and Sensor Static Data                        | 1.2.6.1 |
| Provide Static Data Store Output Interface                     | 1.2.6.2 |
| Collect Indicator Fault Data                                   | 1.2.8.1 |
| Maintain Indicator Fault Data Store                            | 1.2.8.2 |
| Provide Device Fault Interface for M and C                     | 1.2.8.3 |
| Provide Traffic Operations Personnel Indicator Fault Interface | 1.2.8.4 |
| Analyze Traffic Data for Incidents                             | 1.3.1.1 |
| Maintain Static Data for Incident Management                   | 1.3.1.2 |
| Store Possible Incident Data                                   | 1.3.2.1 |
| Review and Classify Possible Incidents                         | 1.3.2.2 |
| Review and Classify Planned Events                             | 1.3.2.3 |

**Table 4-3. Relevant Specs – Physical Architecture Perspective (continued)**

|  |         |
|--|---------|
| Provide Planned Events Store Interface                       | 1.3.2.4 |
| Provide Current Incidents Store Interface                    | 1.3.2.5 |
| Respond to Current Incidents                                 | 1.3.3   |
| Retrieve Incident Data                                       | 1.3.4.1 |
| Provide Traffic Operations Personnel Incident Data Interface | 1.3.4.2 |
| Provide Media Incident Data Interface                        | 1.3.4.3 |
| Update Incident Display Map Data                             | 1.3.4.4 |
| Manage Resources for Incidents                               | 1.3.4.5 |
| Manage Possible Predetermined Responses Store                | 1.3.5   |
| Manage Predetermined Incident Response Data                  | 1.3.6   |
| Analyze Incident Response Log                                | 1.3.7   |
| Provide Traffic Operations Personnel Demand Interface        | 1.4.1   |
| Collect Demand Forecast Data                                 | 1.4.2   |
| Update Demand Display Map Data                               | 1.4.3   |
| Implement Demand Management Policy                           | 1.4.4   |
| Calculate Forecast Demand                                    | 1.4.5   |
| Exchange Data with Rail Operations                           | 1.6.2.1 |
| Manage Alerts and Advisories                                 | 1.6.2.2 |
| Manage Rail Traffic Control Data                             | 1.6.2.3 |
| Manage HRI Closures  | 1.6.4.1 |
| Exchange Data with Traffic Management                        | 1.6.4.2 |
| Process TM Detected Violations                               | 5.4.1   |
| Monitor Vehicle Speed on Roadway                             | 9.3.3.3 |
| <b>Transit Management Subsystem</b>                          |         |
| Provide Transit Vehicle Correction Data Output Interface     | 4.1.2.4 |
| Manage Transit Vehicle Deviations                            | 4.1.4   |
| Provide Transit Vehicle Status Information                   | 4.1.5   |
| Manage Transit Vehicle Operations Data                       | 4.1.6   |
| Provide Transit Vehicle Deviation Data Output Interface      | 4.1.7   |
| Process Demand Responsive Transit Trip Request               | 4.2.1.1 |

**Table 4-3. Relevant Specs – Physical Architecture Perspective (continued)**

|   |         |
|---|---------|
| Compute Demand Responsive Transit Vehicle Availability          | 4.2.1.2 |
| Generate Demand Responsive Transit Schedule and Routes          | 4.2.1.3 |
| Confirm Demand Responsive Transit Schedule and Route            | 4.2.1.4 |
| Provide Transit Plans Store Interface                           | 4.2.2   |
| Generate Transit Routes   | 4.2.3.1 |
| Generate Transit Schedules                                      | 4.2.3.2 |
| Produce Transit Service Data for External Use                   | 4.2.3.3 |
| Provide Transit Fleet Manager Interface for Services Generation | 4.2.3.4 |
| Manage Transit Operational Data Store                           | 4.2.3.5 |
| Produce Transit Service Data for Manage Transit Use             | 4.2.3.6 |
| Provide Interface for Other TRM Data                            | 4.2.3.7 |
| Provide Interface for Transit Service Raw Data                  | 4.2.3.8 |
| Update Transit Map Data   | 4.2.3.9 |
| Manage Transit Archive Data                                     | 4.2.4   |
| Monitor Transit Vehicle Condition                               | 4.3.1   |
| Generate Transit Vehicle Maintenance Schedules                  | 4.3.2   |
| Generate Technician Work Assignments                            | 4.3.3   |
| Monitor And Verify Maintenance Activity                         | 4.3.4   |
| Report Transit Vehicle Information                              | 4.3.5   |
| Update Transit Vehicle Information                              | 4.3.6   |
| Manage Transit Vehicle Operations Data Store                    | 4.3.7   |
| Manage Transit Security   | 4.4.1.1 |
| Provide Transit System Operator Security Interface              | 4.4.1.3 |
| Provide Transit External Interface for Emergencies              | 4.4.1.4 |
| Collect Transit Vehicle Emergency Information                   | 4.4.1.6 |
| Coordinate Multiple Agency Responses to Transit Incidents       | 4.4.2   |
| Generate Responses for Transit Incidents                        | 4.4.3   |
| Assess Transit Driver Performance                               | 4.5.1   |
| Assess Transit Driver Availability                              | 4.5.2   |
| Access Transit Driver Cost Effectiveness                        | 4.5.3   |
| Assess Transit Driver Eligibility                               | 4.5.4   |
| Generate Transit Driver Route Assignments                       | 4.5.5   |

**Table 4-3. Relevant Specs – Physical Architecture Perspective (continued)**

|   |         |
|---|---------|
| Update Transit Driver Information                           | 4.5.6   |
| Report Transit Driver Information                           | 4.5.7   |
| Provide Transit Driver Information Store Interface          | 4.5.8   |
| Manage Transit Vehicle Advanced Payments                    | 4.6.8   |
| Process Fare Payment Violations                             | 5.4.4   |
| Process Vehicle Fare Collection Violations                  | 5.4.5   |
| Process Roadside Fare Collection Violations                 | 5.4.7   |
| Register for Advanced Transit Fare Payment                  | 7.3.1.1 |
| Determine Advanced Transit Fares                            | 7.3.1.2 |
| Manage Transit Fare Financial Processing                    | 7.3.1.3 |
| Check for Advanced Transit Fare Payment                     | 7.3.1.4 |
| Bill Transit User for Transit Fare                          | 7.3.1.5 |
| Collect Bad Transit Fare Payment Data                       | 7.3.1.6 |
| Update Transit Fare Data                                    | 7.3.1.7 |
| Get Transit User Image for Violation                        | 7.3.3   |
| Process Transit User Other Services Payments                | 7.4.1.5 |
| <b>Transit Vehicle Subsystem</b>                            |         |
| Process Transit Vehicle Sensor Data                         | 4.1.1   |
| Determine Transit Vehicle Deviation and ETA                 | 4.1.2.1 |
| Determine Transit Vehicle Corrective Instructions           | 4.1.2.2 |
| Provide Transit Vehicle Driver Interface                    | 4.1.2.3 |
| Request Transit Vehicle Priorities                          | 4.1.2.5 |
| Provide Transit Vehicle Location Data                       | 4.1.3   |
| Process Transit Vehicle Sensor Maintenance Data             | 4.1.9   |
| Process Demand Responsive Transit Vehicle Availability Data | 4.2.1.5 |
| Provide Demand Responsive Transit Driver Interface          | 4.2.1.6 |
| Manage Transit Emergencies                                  | 4.4.1.2 |
| Provide Transit Driver Interface for Emergencies            | 4.4.1.5 |
| Detect Transit User on Vehicle                              | 4.6.1   |
| Determine Transit User Needs on Vehicle                     | 4.6.2   |
| Determine Transit Fare on Vehicle                           | 4.6.3   |
| Manage Transit Fare Billing on Vehicle                      | 4.6.4   |

**Table 4-3. Relevant Specs – Physical Architecture Perspective (continued)**

|  |           |
|--|-----------|
| Provide Transit User Fare Payment Interface on Vehicle | 4.6.5     |
| Update Transit Vehicle Fare Data                       | 4.6.6     |
| Provide Transit Vehicle Passenger Data                 | 4.6.7     |
| Provide Transit User Advisory Interface                | 6.2.3     |
| Provide Transit Advisory Data On Vehicle               | 6.2.7     |
| Provide Transit Vehicle Traveler Card Interface        | 7.3.5     |
| <b>Vehicle Subsystem</b>                               |           |
| Carry-out Safety Analysis                              | 3.1.2     |
| Provide Communications Function                        | 3.3.1     |
| Prepare and Output In-vehicle Displays                 | 6.2.2     |
| Provide Driver Information Interface                   | 6.2.5     |
| Build Driver Personal Security Message                 | 6.7.1.1   |
| Provide Driver In-vehicle Communications Function      | 6.7.1.2   |
| Determine In-Vehicle Guidance Method                   | 6.7.2.1.1 |
| Provide Dynamic In-Vehicle Guidance                    | 6.7.2.1.2 |
| Process Vehicle Location Data                          | 6.7.2.2   |
| Provide Driver Guidance Interface                      | 6.7.2.3   |
| Update Vehicle Navigable Map Database                  | 6.7.2.4   |
| Provide Driver Toll Payment Interface                  | 7.1.4     |
| Provide Traveler Card Interface for Tolls              | 7.1.7     |
| Provide Vehicle Traveler Card Interface                | 7.5.1     |

Table 4-4, organizes the 329 pspecs listed above to show the National ITS Architecture logical perspective. This chart illustrates pspec relationships within the context of the nine major ITS functional categories and associated subcategories as discussed earlier (see Section 4.3.1). Please note that only a subset of the National ITS Architecture Program category titles are present. This is because not all titles contain pspecs that are relevant to the Regional ITS.

**Table 4-4. Relevant Pspecs - Logical Architecture Perspective**

| FUNCTION |                       |                                     |   | PSPEC   |
|----------|-----------------------|-------------------------------------|---|---------|
| <b>1</b> | <b>Manage Traffic</b> |                                     |   |         |
|          | 1.1                   | <i>Provide Traffic Surveillance</i> |   |         |
|          |                       | 1.1.1                               | <u>Process Sensor Data</u>  |         |
|          |                       |                                     | 1.1.1.1 Process Traffic Sensor Data                                 | 1.1.1.1 |
|          |                       |                                     | 1.1.1.2 Collect and Process Sensor Fault Data                       | 1.1.1.2 |
|          |                       |                                     | 1.1.1.3 Process Environmental Sensor Data                           | 1.1.1.3 |
|          |                       |                                     | 1.1.1.4 Manage Data Collection and Monitoring                       | 1.1.1.4 |
|          |                       |                                     | 1.1.1.5 Provide Sensor Interface to Other Roadway Devices           | 1.1.1.5 |
|          |                       |                                     | 1.1.1.6 Collect Infrastructure Sensor Data                          | 1.1.1.6 |
|          |                       | 1.1.2                               | <u>Process and Store Traffic Data</u>                               |         |
|          |                       |                                     | 1.1.2.1 Process Traffic Data for Storage                            | 1.1.2.1 |
|          |                       |                                     | 1.1.2.2 Process Traffic Data  | 1.1.2.2 |
|          |                       |                                     | 1.1.2.3 Update Data Source Static Data                              | 1.1.2.3 |
|          |                       |                                     | 1.1.2.5 Process Probe Data  | 1.1.2.5 |
|          |                       |                                     | 1.1.2.7 Monitor Reversible Lanes                                    | 1.1.2.7 |
|          |                       | 1.1.3                               | <u>Generate Predictive Traffic Model</u>                            | 1.1.3   |
|          |                       | 1.1.4                               | <u>Manage Data Collection and Monitoring</u>                        |         |
|          |                       |                                     | 1.1.4.1 Retrieve Traffic Data                                       | 1.1.4.1 |
|          |                       |                                     | 1.1.4.2 Provide Traffic Operations Personnel Traffic Data Interface | 1.1.4.2 |
|          |                       |                                     | 1.1.4.3 Provide Direct Media Traffic Data Interface                 | 1.1.4.3 |
|          |                       |                                     | 1.1.4.4 Update Traffic Display Map Data                             | 1.1.4.4 |
|          |                       |                                     | 1.1.4.5 Provide Media System Traffic Data Interface                 | 1.1.4.5 |
|          |                       |                                     | 1.1.4.6 Provide Traffic Data Retrieval Interface                    | 1.1.4.6 |
|          |                       |                                     | 1.1.4.7 Manage Traffic Archive Data                                 | 1.1.4.7 |
|          |                       | 1.1.5                               | <u>Exchange data with Other Traffic Centers</u>                     | 1.1.5   |
|          |                       | 1.1.6                               | <u>Collect Vehicle Probe Data</u>                                   | 1.1.6   |
|          | 1.2                   | <i>Provide Device Control</i>       |   |         |



| FUNCTION |       |   |  | PSPEC   |
|----------|-------|---|--|---------|
|          | 1.2.1 | <u>Select Strategy</u>                          |  | 1.2.1   |
|          | 1.2.2 | <u>Determine Road and Freeway State</u>         |  |         |
|          |       | 1.2.2.1   | Determine Indicator State for Freeway Management               | 1.2.2.1 |
|          |       | 1.2.2.2   | Determine Indicator State for Road Management                  | 1.2.2.2 |
|          | 1.2.4 | <u>Output Control Data</u>                      |  |         |
|          |       | 1.2.4.1   | Output Control Data for Roads                                  | 1.2.4.1 |
|          |       | 1.2.4.2   | Output Control Data for Freeways                               | 1.2.4.2 |
|          |       | 1.2.4.3   | Output In-vehicle Signage Data                                 | 1.2.4.3 |
|          |       | 1.2.4.4   | Output Roadway Information Data                                | 1.2.4.4 |
|          | 1.2.6 | <u>Maintain Static Data for TMC</u>             |  |         |
|          |       | 1.2.6.1   | Maintain Traffic and Sensor Static Data                        | 1.2.6.1 |
|          |       | 1.2.6.2   | Provide Static Data Store Output Interface                     | 1.2.6.2 |
|          | 1.2.7 | <u>Provide Roadside Control Facilities</u>      |  |         |
|          |       | 1.2.7.1   | Process Indicator Output Data for Roads                        | 1.2.7.1 |
|          |       | 1.2.7.2   | Monitor Roadside Equipment Operation for Faults                | 1.2.7.2 |
|          |       | 1.2.7.3   | Manage Indicator Preemptions                                   | 1.2.7.3 |
|          |       | 1.2.7.4   | Process In-vehicle Signage Data                                | 1.2.7.4 |
|          |       | 1.2.7.5   | Process Indicator Output Data for Freeways                     | 1.2.7.5 |
|          |       | 1.2.7.8   | Provide Device Interface to Other Roadway Devices              | 1.2.7.8 |
|          |       | 1.2.7.9   | Process Roadway Information Data                               | 1.2.7.9 |
|          | 1.2.8 | <u>Collect and Process Indicator Fault Data</u> |  |         |
|          |       | 1.2.8.1   | Collect Indicator Fault Data                                   | 1.2.8.1 |
|          |       | 1.2.8.2   | Maintain Indicator Fault Data Store                            | 1.2.8.2 |
|          |       | 1.2.8.3   | Provide Device Fault Interface for M and C                     | 1.2.8.3 |
|          |       | 1.2.8.4   | Provide Traffic Operations Personnel Indicator Fault Interface | 1.2.8.4 |
|          | 1.3   | <i>Manage Incidents</i>                         |  |         |
|          | 1.3.1 | <u>Traffic Data Analysis for Incidents</u>      |  |         |
|          |       | 1.3.1.1   | Analyze Traffic Data for Incidents                             | 1.3.1.1 |
|          |       | 1.3.1.2   | Maintain Static Data for Incident Management                   | 1.3.1.2 |
|          |       | 1.3.1.3   | Process Traffic Images   | 1.3.1.3 |
|          | 1.3.2 | <u>Review and Manage Incident Data</u>          |  |         |
|          |       | 1.3.2.1   | Store Possible Incident Data                                   | 1.3.2.1 |
|          |       | 1.3.2.2   | Review and Classify Possible Incidents                         | 1.3.2.2 |
|          |       | 1.3.2.3   | Review and Classify Planned Events                             | 1.3.2.3 |
|          |       | 1.3.2.4   | Provide Planned Events Store Interface                         | 1.3.2.4 |

| FUNCTION |  |  |  | PSPEC     |
|----------|--|--|--|-----------|
|          |  | 1.3.2.5  | Provide Current Incidents Store Interface                    | 1.3.2.5   |
|          | 1.3.3                                    | <u>Respond to Current Incidents</u>                          |  | 1.3.3     |
|          | 1.3.4                                    | <u>Provide Operator Interfaces for Incidents</u>             |  |           |
|          |  | 1.3.4.1  | Retrieve Incident Data                                       | 1.3.4.1   |
|          |  | 1.3.4.2  | Provide Traffic Operations Personnel Incident Data Interface | 1.3.4.2   |
|          |  | 1.3.4.3  | Provide Media Incident Data Interface                        | 1.3.4.3   |
|          |  | 1.3.4.4  | Update Incident Display Map Data                             | 1.3.4.4   |
|          |  | 1.3.4.5  | Manage Resources for Incidents                               | 1.3.4.5   |
|          | 1.3.5                                    | <u>Manage Possible Predetermined Responses Store</u>         |  | 1.3.5     |
|          | 1.3.6                                    | <u>Manage Predetermined Incident Response Data</u>           |  | 1.3.6     |
|          | 1.3.7                                    | <u>Analyze Incident Response Log</u>                         |  | 1.3.7     |
| 1.4      | <i>Manage Travel Demand</i>              |  |  |           |
|          | 1.4.1                                    | <u>Provide Traffic Operations Personnel Demand Interface</u> |  | 1.4.1     |
|          | 1.4.2                                    | <u>Collect Demand Forecast Data</u>                          |  | 1.4.2     |
|          | 1.4.3                                    | <u>Update Demand Display Map Data</u>                        |  | 1.4.3     |
|          | 1.4.4                                    | <u>Implement Demand Management Policy</u>                    |  | 1.4.4     |
|          | 1.4.5                                    | <u>Calculate Forecast Demand</u>                             |  | 1.4.5     |
| 1.6      | <i>Manage Highway Rail Intersections</i> |  |  |           |
|          | 1.6.1                                    | <u>Manage HRI Vehicle Traffic</u>                            |  |           |
|          |  | 1.6.1.1  | Detect Roadway Events  | 1.6.1.1   |
|          |  | 1.6.1.2  | Activate HRI Device Controls                                 |           |
|          |  | 1.6.1.2.1  | Control HRI Traffic Signals                                  | 1.6.1.2.1 |
|          |  | 1.6.1.2.2  | Control HRI Warnings and Barriers                            | 1.6.1.2.2 |
|          |  | 1.6.1.2.3  | Provide SSR Device Controls                                  | 1.6.1.2.3 |
|          |  | 1.6.1.2.4  | Provide HSR Device Controls                                  | 1.6.1.2.4 |
|          |  | 1.6.1.2.5  | Manage Device Control  | 1.6.1.2.5 |
|          |  | 1.6.1.2.6  | Maintain Device State  | 1.6.1.2.6 |
|          |  | 1.6.1.3  | Perform Equipment Self-Test                                  | 1.6.1.3   |
|          |  | 1.6.1.4  | Provide Advisories and Alerts                                |           |
|          |  | 1.6.1.4.1  | Generate Alerts and Advisories                               | 1.6.1.4.1 |
|          |  | 1.6.1.4.2  | Provide Closure Parameters                                   | 1.6.1.4.2 |
|          |  | 1.6.1.4.3  | Report Alerts and Advisories                                 | 1.6.1.4.3 |
|          |  | 1.6.1.4.4  | Report HRI Status on Approach                                | 1.6.1.4.4 |
|          |  | 1.6.1.5  | Detect HRI Hazards   | 1.6.1.5   |
|          |  | 1.6.1.6  | Provide Advance Warnings                                     |           |

| FUNCTION |   |   |  |  |  | PSPEC     |
|----------|---|---|--|--|--|-----------|
|          |   |   | 1.6.1.6.1  | Close HRI on Detection                                   |  | 1.6.1.6.1 |
|          |   |   | 1.6.1.6.2  | Detect Imminent Vehicle/Train Collision                  |  | 1.6.1.6.2 |
|          |   | 1.6.1.7   | Execute Local Control Strategy                             |  |  |           |
|          |   |   | 1.6.1.7.1  | Control Vehicle Traffic at Passive HRI                   |  | 1.6.1.7.1 |
|          |   |   | 1.6.1.7.2  | Close HRI on Command                                     |  | 1.6.1.7.2 |
|          |   | 1.6.2   | <u>Interact with Rail Operations</u>                       |  |  |           |
|          |   |   | 1.6.2.1  | Exchange Data with Rail Operations                       |  | 1.6.2.1   |
|          |   |   | 1.6.2.2  | Manage Alerts and Advisories                             |  | 1.6.2.2   |
|          |   |   | 1.6.2.3  | Manage Rail Traffic Control Data                         |  | 1.6.2.3   |
|          |   | 1.6.3   | <u>Manage HRI Rail Traffic</u>                             |  |  |           |
|          |   |   | 1.6.3.1  | Interact with Wayside Systems                            |  | 1.6.3.1   |
|          |   |   | 1.6.3.2  | Advise and Protect Train Crews                           |  | 1.6.3.2   |
|          |   |   | 1.6.3.3  | Provide ATS Alerts                                       |  | 1.6.3.3   |
|          |   | 1.6.4   | <u>Interact with Traffic Volume Management</u>             |  |  |           |
|          |   |   | 1.6.4.1  | Manage HRI Closures                                      |  | 1.6.4.1   |
|          |   |   | 1.6.4.2  | Exchange Data with Traffic Management                    |  | 1.6.4.2   |
|          |   | 1.6.5   | <u>Monitor HRI Status</u>                                  |  |  |           |
|          |   |   | 1.6.5.1  | Provide Interactive Interface                            |  | 1.6.5.1   |
|          |   |   | 1.6.5.2  | Determine HRI Status                                     |  | 1.6.5.2   |
|          |   |   | 1.6.5.3  | Maintain HRI Closure Data                                |  | 1.6.5.3   |
| <b>3</b> | <b>Provide Vehicle Monitoring and Control</b> |   |  |  |  |           |
|          | 3.1   | <i>Monitor Vehicle Status</i>                   |  |  |  |           |
|          |   | 3.1.2   | <u>Carry-out Safety Analysis</u>                           |  |  | 3.1.2     |
|          | 3.3   | <i>Provide Automatic Emergency Notification</i> |  |  |  |           |
|          |   | 3.3.1   | <u>Provide Communications Function</u>                     |  |  | 3.3.1     |
| <b>4</b> | <b>Manage Transit</b>                         |   |  |  |  |           |
|          | 4.1   | <i>Operate Vehicles and Facilities</i>          |  |  |  |           |
|          |   | 4.1.1   | <u>Process Transit Vehicle Sensor Data</u>                 |  |  | 4.1.1     |
|          |   | 4.1.2   | <u>Determine Transit Vehicle Deviation and Corrections</u> |  |  |           |
|          |   |   | 4.1.2.1  | Determine Transit Vehicle Deviation and ETA              |  | 4.1.2.1   |
|          |   |   | 4.1.2.2  | Determine Transit Vehicle Corrective Instructions        |  | 4.1.2.2   |
|          |   |   | 4.1.2.3  | Provide Transit Vehicle Driver Interface                 |  | 4.1.2.3   |
|          |   |   | 4.1.2.4  | Provide Transit Vehicle Correction Data Output Interface |  | 4.1.2.4   |
|          |   |   | 4.1.2.5  | Request Transit Vehicle Priorities                       |  | 4.1.2.5   |
|          |   | 4.1.3   | <u>Provide Transit Vehicle Location Data</u>               |  |  | 4.1.3     |

| FUNCTION |   |   | PSPEC   |
|----------|---|---|---------|
|          | 4.1.4                                       | <u>Manage Transit Vehicle Deviations</u>                                | 4.1.4   |
|          | 4.1.5                                       | <u>Provide Transit Vehicle Status Information</u>                       | 4.1.5   |
|          | 4.1.6                                       | <u>Manage Transit Vehicle Operations Data</u>                           | 4.1.6   |
|          | 4.1.7                                       | <u>Provide Transit Vehicle Deviation Data Output Interface</u>          | 4.1.7   |
|          | 4.1.8                                       | <u>Provide Transit Operations Data Distribution Interface</u>           | 4.1.8   |
|          | 4.1.9                                       | <u>Process Transit Vehicle Sensor Maintenance Data</u>                  | 4.1.9   |
| 4.2      | <i>Plan and Schedule Transit Services</i>   |   |         |
|          | 4.2.1                                       | <u>Provide Demand Responsive Transit Service</u>                        |         |
|          |   | 4.2.1.1 Process Demand Responsive Transit Trip Request                  | 4.2.1.1 |
|          |   | 4.2.1.2 Compute Demand Responsive Transit Vehicle Availability          | 4.2.1.2 |
|          |   | 4.2.1.3 Generate Demand Responsive Transit Schedule and Routes          | 4.2.1.3 |
|          |   | 4.2.1.4 Confirm Demand Responsive Transit Schedule and Route            | 4.2.1.4 |
|          |   | 4.2.1.5 Process Demand Responsive Transit Vehicle Availability Data     | 4.2.1.5 |
|          |   | 4.2.1.6 Provide Demand Responsive Transit Driver Interface              | 4.2.1.6 |
|          | 4.2.2                                       | <u>Provide Transit Plans Store Interface</u>                            | 4.2.2   |
|          | 4.2.3                                       | <u>Generate Transit Routes and Schedules</u>                            |         |
|          |   | 4.2.3.1 Generate Transit Routes   | 4.2.3.1 |
|          |   | 4.2.3.2 Generate Schedules  | 4.2.3.2 |
|          |   | 4.2.3.3 Produce Transit Service Data for External Use                   | 4.2.3.3 |
|          |   | 4.2.3.4 Provide Transit Fleet Manager Interface for Services Generation | 4.2.3.4 |
|          |   | 4.2.3.5 Manage Transit Operational Data Store                           | 4.2.3.5 |
|          |   | 4.2.3.6 Produce Transit Service Data for Manage Transit Use             | 4.2.3.6 |
|          |   | 4.2.3.7 Provide Interface for Other TRM Data                            | 4.2.3.7 |
|          |   | 4.2.3.8 Provide Interface for Transit Service Raw Data                  | 4.2.3.8 |
|          |   | 4.2.3.9 Update Transit Map Data   | 4.2.3.9 |
|          |   | 4.2.4 Manage Transit Archive Data                                       | 4.2.4   |
| 4.3      | <i>Schedule Transit Vehicle Maintenance</i> |   |         |
|          | 4.3.1                                       | <u>Monitor Transit Vehicle Condition</u>                                | 4.3.1   |
|          | 4.3.2                                       | <u>Generate Transit Vehicle Maintenance Schedules</u>                   | 4.3.2   |
|          | 4.3.3                                       | <u>Generate Technician Work Assignments</u>                             | 4.3.1   |
|          | 4.3.4                                       | <u>Monitor And Verify Maintenance Activity</u>                          | 4.3.4   |
|          | 4.3.5                                       | <u>Report Transit Vehicle Information</u>                               | 4.3.5   |
|          | 4.3.6                                       | <u>Update Transit Vehicle Information</u>                               | 4.3.6   |
|          | 4.3.7                                       | <u>Manage Transit Vehicle Operations Data Store</u>                     | 4.3.7   |
| 4.4      | <i>Support Security and Coordination</i>    |   |         |

| FUNCTION |   |   |  | PSPEC   |
|----------|---|---|--|---------|
|          | 4.4.1   | <u>Provide Transit Security and Emergency Management</u>        |  |         |
|          |   | 4.4.1.1   | Manage Transit Security                            | 4.4.1.1 |
|          |   | 4.4.1.2   | Manage Transit Emergencies                         | 4.4.1.2 |
|          |   | 4.4.1.3   | Provide Transit System Operator Security Interface | 4.4.1.3 |
|          |   | 4.4.1.4   | Provide Transit External Interface for Emergencies | 4.4.1.4 |
|          |   | 4.4.1.5   | Provide Transit Driver Interface for Emergencies   | 4.4.1.5 |
|          |   | 4.4.1.6   | Collect Transit Vehicle Emergency Information      | 4.4.1.6 |
|          | 4.4.2   | <u>Coordinate Multiple Agency Responses to Incidents</u>        |  | 4.4.2   |
|          | 4.4.3   | <u>Generate Responses for Incidents</u>                         |  | 4.4.3   |
| 4.5      | <i>Generate Transit Driver Schedules</i>        |   |  |         |
|          | 4.5.1   | <u>Assess Transit Driver Performance</u>                        |  | 4.5.1   |
|          | 4.5.2   | <u>Assess Transit Driver Availability</u>                       |  | 4.5.2   |
|          | 4.5.3   | <u>Access Transit Driver Cost Effectiveness</u>                 |  | 4.5.3   |
|          | 4.5.4   | <u>Assess Transit Driver Eligibility</u>                        |  | 4.5.4   |
|          | 4.5.5   | <u>Generate Transit Driver Route Assignments</u>                |  | 4.5.5   |
|          | 4.5.6   | <u>Update Transit Driver Information</u>                        |  | 4.5.6   |
|          | 4.5.7   | <u>Report Transit Driver Information</u>                        |  | 4.5.7   |
|          | 4.5.8   | <u>Provide Transit Driver Information Store Interface</u>       |  | 4.5.8   |
| 4.6      | <i>Collect Transit Fares in the Vehicle</i>     |   |  |         |
|          | 4.6.1   | <u>Detect Transit User on Vehicle</u>                           |  | 4.6.1   |
|          | 4.6.2   | <u>Determine Transit User Needs on Vehicle</u>                  |  | 4.6.2   |
|          | 4.6.3   | <u>Determine Transit Fare on Vehicle</u>                        |  | 4.6.3   |
|          | 4.6.4   | <u>Manage Transit Fare Billing on Vehicle</u>                   |  | 4.6.4   |
|          | 4.6.5   | <u>Provide Transit User Fare Payment Interface on Vehicle</u>   |  | 4.6.5   |
|          | 4.6.6   | <u>Update Transit Vehicle Fare Data</u>                         |  | 4.6.6   |
|          | 4.6.7   | <u>Provide Transit Vehicle Passenger Data</u>                   |  | 4.6.7   |
|          | 4.6.8   | <u>Manage Transit Vehicle Advanced Payments</u>                 |  | 4.6.8   |
| 4.7      | <i>Provide Transit User Roadside Facilities</i> |   |  |         |
|          | 4.7.1   | <u>Provide Transit User Roadside and Vehicle Data Interface</u> |  |         |
|          | 4.7.2   | <u>Collect Transit Fares at the Roadside</u>                    |  |         |
|          |   | 4.7.2.1   | Detect Transit User at Roadside                    | 4.7.2.1 |
|          |   | 4.7.2.2   | Determine Transit User Needs at Roadside           | 4.7.2.2 |
|          |   | 4.7.2.3   | Determine Transit Fare at Roadside                 | 4.7.2.3 |
|          |   | 4.7.2.4   | Manage Transit Fare Billing at Roadside            | 4.7.2.4 |
|          |   | 4.7.2.5   | Provide Transit User Roadside Fare Interface       | 4.7.2.5 |

| FUNCTION |   |  |  | PSPEC   |
|----------|---|--|--|---------|
|          |   | 4.7.2.6  | Update Roadside Transit Fare Data                    | 4.7.2.6 |
|          |   | 4.7.2.7  | Provide Transit Roadside Passenger Data              | 4.7.2.7 |
| <b>5</b> | <b>Manage Emergency Services</b>            |  |  |         |
|          | 5.1   | <i>Provide Emergency Service Allocation</i>          |  |         |
|          |   | 5.1.1  | <u>Identify Emergencies from Inputs</u>              | 5.1.1   |
|          |   | 5.1.2  | <u>Determine Coordinated Response Plan</u>           | 5.1.2   |
|          |   | 5.1.3  | <u>Communicate Emergency Status</u>                  | 5.1.3   |
|          |   | 5.1.4  | <u>Manage Emergency Response</u>                     | 5.1.4   |
|          |   | 5.1.5  | <u>Manage Emergency Service Allocation Store</u>     | 5.1.5   |
|          |   | 5.1.6  | <u>Process Mayday Messages</u>                       | 5.1.6   |
|          |   | 5.1.7  | <u>Provide Traveler Security</u>                     |         |
|          |   | 5.1.7.1  | Monitor Secure Area                                  | 5.1.7.1 |
|          |   | 5.1.7.2  | Manage Secure Area Security                          | 5.1.7.2 |
|          |   | 5.1.7.3  | Report Traveler Emergencies                          | 5.1.7.3 |
|          |   |  |  |         |
|          | 5.2   | <i>Provide Operator Interface for Emergency Data</i> |  | 5.2     |
|          | 5.3   | <i>Manage Emergency Vehicles</i>                     |  |         |
|          |   | 5.3.1  | <u>Select Response Mode</u>                          | 5.3.1   |
|          |   | 5.3.2  | <u>Dispatch Vehicle</u>                              | 5.3.2   |
|          |   | 5.3.3  | <u>Track Vehicle</u>                                 | 5.3.3   |
|          |   | 5.3.4  | <u>Assess Response Status</u>                        | 5.3.4   |
|          |   | 5.3.5  | <u>Provide Emergency Personnel Interface</u>         | 5.3.5   |
|          |   | 5.3.6  | <u>Maintain Vehicle Status</u>                       | 5.3.6   |
|          |   | 5.3.7  | <u>Provide Emergency Vehicle Route</u>               | 5.3.7   |
|          | 5.4   | <i>Provide Law Enforcement Allocation</i>            |  |         |
|          |   | 5.4.1  | <u>Process TM Detected Violations</u>                | 5.4.1   |
|          |   | 5.4.2  | <u>Process Violations for Tolls</u>                  | 5.4.2   |
|          |   | 5.4.4  | <u>Process Fare Payment Violations</u>               | 5.4.4   |
|          |   | 5.4.5  | <u>Process Vehicle Fare Collection Violations</u>    | 5.4.5   |
|          |   | 5.4.7  | <u>Process Roadside Fare Collection Violations</u>   | 5.4.7   |
|          | 5.5   | <i>Update Emergency Display Map Data</i>             |  | 5.5     |
|          | 5.6   | <i>Manage Emergency Services Data</i>                |  | 5.6     |
| <b>6</b> | <b>Provide Driver and Traveler Services</b> |  |  |         |
|          | 6.1   | <i>Provide Trip Planning Services</i>                |  |         |
|          |   | 6.1.1  | <u>Provide Trip Planning Information to Traveler</u> | 6.1.1   |

| FUNCTION |  |  |   | PSPEC   |
|----------|--|--|---|---------|
|          | 6.1.2  | <u>Confirm Traveler's Trip Plan</u>                                |   | 6.1.2   |
|          | 6.1.3  | <u>Manage Multimodal Service Provider Interface</u>                |   | 6.1.3   |
|          | 6.1.4  | <u>Provide ISP Operator Interface for Trip Planning Parameters</u> |   | 6.1.4   |
|          | 6.1.5  | <u>Collect Service Requests and Confirmation for Archive</u>       |   | 6.1.5   |
|          | 6.1.6  | <u>Manage Traveler Info Archive Data</u>                           |   | 6.1.6   |
| 6.2      | <i>Provide Information Services</i>                |  |   |         |
|          | 6.2.1  | Provide Advisory and Broadcast Data                                |   |         |
|          |  | 6.2.1.1  | Collect Traffic Data for Advisory Messages          | 6.2.1.1 |
|          |  | 6.2.1.2  | Provide Traffic and Transit Advisory Messages       | 6.2.1.2 |
|          |  | 6.2.1.3  | Collect Transit Data for Advisory Messages          | 6.2.1.3 |
|          |  | 6.2.1.4  | Provide Traffic and Transit Broadcast Messages      | 6.2.1.4 |
|          |  | 6.2.1.5  | Provide ISP Operator Broadcast Parameters Interface | 6.2.1.5 |
|          |  | 6.2.1.6  | Collect Environmental Probe Data                    | 6.2.1.6 |
|          | 6.2.2  | <u>Prepare and Output In-vehicle Displays</u>                      |   | 6.2.2   |
|          | 6.2.3  | <u>Provide Transit User Advisory Interface</u>                     |   | 6.2.3   |
|          | 6.2.4  | <u>Collect Yellow Pages Data</u>                                   |   | 6.2.4   |
|          | 6.2.5  | <u>Provide Driver Information Interface</u>                        |   | 6.2.5   |
|          | 6.2.6  | <u>Provide Yellow Pages Data and Reservations</u>                  |   | 6.2.6   |
|          | 6.2.7  | <u>Provide Transit Advisory Data On Vehicle</u>                    |   | 6.2.7   |
| 6.3      | <i>Provide Traveler Services at Kiosks</i>         |  |   |         |
|          | 6.3.1  | <u>Get Traveler Request</u>  |   | 6.3.1   |
|          | 6.3.2  | <u>Inform Traveler</u>   |   | 6.3.2   |
|          | 6.3.3  | <u>Provide Traveler Kiosk Interface</u>                            |   | 6.3.3   |
|          | 6.3.4  | <u>Update Traveler Display Map Data at Kiosk</u>                   |   |         |
| 6.5      | <i>Manage Yellow Pages Services</i>                |  |   |         |
|          | 6.5.1  | <u>Collect and Update Traveler Information</u>                     |   | 6.5.1   |
|          | 6.5.2  | <u>Provide Traveler Yellow Pages Information and Reservations</u>  |   | 6.5.2   |
|          | 6.5.3  | <u>Register Yellow Pages Service Providers</u>                     |   | 6.5.3   |
|          | 6.5.4  | <u>Provide Traveler Event Information</u>                          |   | 6.5.4   |
| 6.6      | <i>Provide Guidance and Trip Planning Services</i> |  |   |         |
|          | 6.6.1  | <u>Provide Multimodal Route Selection</u>                          |   | 6.6.1   |
|          | 6.6.2  | <u>Select Vehicle Route</u>  |   |         |
|          |  | 6.6.2.1  | Calculate Vehicle Route                             | 6.6.2.1 |
|          |  | 6.6.2.2  | Provide Vehicle Route Calculation Data              | 6.6.2.2 |
|          |  | 6.6.2.3  | Provide Route Segment Data for Other Areas          | 6.6.2.3 |

| FUNCTION |          |  |   |                                       | PSPEC     |
|----------|----------|--|---|---------------------------------------|-----------|
|          |          | 6.6.2.4  | Update Vehicle Route Selection Map Data             |                                       | 6.6.2.4   |
|          |          | 6.6.2.5  | Provide ISP Operator Route Parameters Interface     |                                       | 6.6.2.5   |
|          |          | 6.6.2.6  | Calculate Vehicle Probe Data for Guidance           |                                       | 6.6.2.6   |
|          |          | 6.6.3  | Update Other Routes Selection Map Data              |                                       | 6.6.3     |
|          |          | 6.6.4  | Select Transit Route                                |                                       | 6.6.4     |
|          |          | 6.6.5  | Select Other Routes                                 |                                       | 6.6.5     |
|          | 6.7      | <i>Provide Driver Personal Services</i>              |   |                                       |           |
|          | 6.7.1    | <u>Provide Driver Personal Security</u>              |   |                                       |           |
|          |          | 6.7.1.1  | Build Driver Personal Security Message              |                                       | 6.7.1.1   |
|          |          | 6.7.1.2  | Provide Driver In-vehicle Communications Function   |                                       | 6.7.1.2   |
|          | 6.7.2    | <u>Provide On-line Vehicle Guidance</u>              |   |                                       |           |
|          |          | 6.7.2.1  | <u>Provide Vehicle Guidance</u>                     |                                       |           |
|          |          |  | 6.7.2.1.1   | Determine In-Vehicle Guidance Method  | 6.7.2.1.1 |
|          |          |  | 6.7.2.1.2   | Provide Dynamic In-Vehicle Guidance   | 6.7.2.1.2 |
|          |          |  | 6.7.2.2   | Process Vehicle Location Data         | 6.7.2.2   |
|          |          |  | 6.7.2.3   | Provide Driver Guidance Interface     | 6.7.2.3   |
|          |          |  | 6.7.2.4   | Update Vehicle Navigable Map Database | 6.7.2.4   |
|          | 6.8      | <i>Provide Traveler Personal Services</i>            |   |                                       |           |
|          | 6.8.1    | <u>Provide On-line Traveler Guidance</u>             |   |                                       |           |
|          |          | 6.8.1.1  | Provide Traveler Emergency Message Interface        |                                       |           |
|          |          |  | 6.8.1.1.1   | Determine In-Vehicle Guidance Method  | 6.8.1.1.1 |
|          |          |  | 6.8.1.1.2   | Provide Dynamic In-Vehicle Guidance   | 6.8.1.1.2 |
|          |          | 6.8.1.2  | Provide Personal Portable Device Guidance Interface |                                       | 6.8.1.2   |
|          |          | 6.8.1.3  | Process Personal Portable Device Location Data      |                                       | 6.8.1.3   |
|          |          | 6.8.1.4  | Update Traveler Navigable Map Database              |                                       | 6.8.1.4   |
|          |          | 6.8.1.5  | Provide Traveler Emergency Message Interface        |                                       | 6.8.1.5   |
|          | 6.8.2    | <u>Provide Traveler Personal Security</u>            |   |                                       |           |
|          |          | 6.8.2.1  | Build Traveler Personal Security Message            |                                       | 6.8.2.1   |
|          |          | 6.8.2.2  | Provide Traveler Emergency Communications Function  |                                       | 6.8.2.2   |
|          | 6.8.3    | <u>Provide Traveler Services at Personal Devices</u> |   |                                       |           |
|          |          | 6.8.3.1  | Get Traveler Personal Request                       |                                       | 6.8.3.1   |
|          |          | 6.8.3.2  | Provide Traveler with Personal Travel Information   |                                       | 6.8.3.2   |
|          |          | 6.8.3.3  | Provide Traveler Personal Interface                 |                                       | 6.8.3.3   |
|          | <b>7</b> | <b>Provide Electronic Payment Services</b>           |   |                                       |           |
|          | 7.1      | <i>Provide Electronic Toll Payment</i>               |   |                                       |           |



| FUNCTION |       |   |   | PSPEC    |
|----------|-------|---|---|----------|
|          | 7.1.1 | <u>Process Electronic Toll Payment</u>                |   |          |
|          |       | 7.1.1.1   | Read Tag Data for Tolls                                     | 7.1.1.1  |
|          |       | 7.1.1.2   | Calculate Vehicle Toll                                      | 7.1.1.2  |
|          |       | 7.1.1.3   | Manage Bad Toll Payment Data                                | 7.1.1.3  |
|          |       | 7.1.1.4   | Check for Advanced Tolls Payment                            | 7.1.1.4  |
|          |       | 7.1.1.5   | Bill Driver for Tolls                                       | 7.1.1.5  |
|          |       | 7.1.1.7   | Update Toll Price Data                                      | 7.1.1.7  |
|          |       | 7.1.1.8   | Register for Advanced Toll Payment                          | 7.1.1.8  |
|          |       | 7.1.1.9   | Manage Toll Financial Processing                            | 7.1.1.9  |
|          |       | 7.1.1.10  | Determine Advanced Toll Bill                                | 7.1.1.10 |
|          |       | 7.1.1.11  | Manage Toll Archive Data                                    | 7.1.1.11 |
|          | 7.1.2 | <u>Produce Roadside Displays</u>                      |   | 7.1.2    |
|          | 7.1.3 | <u>Obtain Toll Violator Image</u>                     |   | 7.1.3    |
|          | 7.1.4 | <u>Provide Driver Toll Payment Interface</u>          |   | 7.1.4    |
|          | 7.1.5 | <u>Detect Vehicle for Tolls</u>                       |   | 7.1.5    |
|          | 7.1.6 | <u>Distribute Advanced Charges and Fares</u>          |   | 7.1.6    |
|          | 7.1.7 | <u>Provide Payment Instrument Interface for Tolls</u> |   | 7.1.7    |
|          | 7.1.8 | <u>Exchange Data with Other Toll Administration</u>   |   | 7.1.8    |
|          | 7.2   | <i>Provide Electronic parking Payment</i>             |   |          |
|          |       | 7.2.1   | <u>Process Electronic Parking Lot Payment</u>               |          |
|          |       | 7.2.6   | Distribute Advanced Tolls and Fares                         | 7.2.6    |
|          | 7.3   | <i>Provide Electronic Fare Collection</i>             |   |          |
|          |       | 7.3.1   | <u>Process Electronic Transit Fare Payment</u>              |          |
|          |       | 7.3.1.1   | Register for Advanced Transit Fare Payment                  | 7.3.1.1  |
|          |       | 7.3.1.2   | Determine Advanced Transit Fares                            | 7.3.1.2  |
|          |       | 7.3.1.3   | Manage Transit Fare Financial Processing                    | 7.3.1.3  |
|          |       | 7.3.1.4   | Check for Advanced Transit Fare Payment                     | 7.3.1.4  |
|          |       | 7.3.1.5   | Bill Transit User for Transit Fare                          | 7.3.1.5  |
|          |       | 7.3.1.6   | Collect Bad Transit Fare Payment Data                       | 7.3.1.6  |
|          |       | 7.3.1.7   | Update Transit Fare Data                                    | 7.3.1.7  |
|          |       | 7.3.2   | <u>Distribute Advanced Tolls and Parking Lot Charges</u>    | 7.3.2    |
|          |       | 7.3.3   | <u>Get Transit User Image for Violation</u>                 | 7.3.3    |
|          |       | 7.3.4   | <u>Provide Remote Terminal Traveler Card Interface</u>      | 7.3.4    |
|          |       | 7.3.5   | <u>Provide Transit Vehicle Payment Instrument Interface</u> | 7.3.5    |

| FUNCTION |  |  |   | PSPEC   |
|----------|--|--|---|---------|
| 7.4      | <i>Carry-out Centralized Payments Processing</i> |  |   |         |
|          | 7.4.1  | <u>Collect Advanced Payments</u>                             |   |         |
|          |  | 7.4.1.2  | Process Yellow Pages Services Provider Payments   | 7.4.1.2 |
|          |  | 7.4.1.3  | Process Driver Map Update Payments                | 7.4.1.3 |
|          |  | 7.4.1.4  | Process Traveler Map Update Payments              | 7.4.1.4 |
|          |  | 7.4.1.5  | Process Transit User Other Services Payments      | 7.4.1.5 |
|          |  | 7.4.1.6  | Process Traveler Trip and Other Services Payments | 7.4.1.6 |
|          |  | 7.4.1.7  | Collect Payment Transaction Records               | 7.4.1.7 |
|          | 7.4.2  | <u>Collect Price Data for ITS Use</u>                        |   | 7.4.2   |
|          | 7.4.3  | <u>Provide Personal Traveler Card Interface</u>              |   | 7.4.3   |
| 7.5      | <i>Provide Traveler Card Interfaces</i>          |  |   |         |
|          | 7.5.1  | <u>Provide Vehicle Traveler Card Interface</u>               |   | 7.5.1   |
|          | 7.5.2  | <u>Provide Transit User Roadside Traveler Card Interface</u> |   | 7.5.2   |
|          | 7.5.3  | <u>Provide Personal Traveler Card Interface</u>              |   | 7.5.3   |
|          | 7.5.4  | <u>Provide Traveler Kiosk Traveler Card Interface</u>        |   | 7.5.4   |
| <b>8</b> | <b>Manage Archived Data</b>                      |  |   |         |
|          | 8.1  | <i>Get Archive Data</i>                                      |   | 8.1     |
|          | 8.2  | <i>Manage Archive</i>  |   | 8.2     |
|          | 8.3  | <i>Manage Archive Data Administrator Interface</i>           |   | 8.3     |
|          | 8.4  | <i>Coordinate Archives</i>                                   |   | 8.4     |
|          | 8.5  | <i>Process Archived Data User System Requests</i>            |   | 8.5     |
|          | 8.6  | <i>Analyze Archive</i>                                       |   | 8.6     |
|          | 8.7  | <i>Process On Demand Archive Requests</i>                    |   | 8.7     |
|          | 8.8  | <i>Prepare Government Reporting Inputs</i>                   |   | 8.8     |
|          | 8.9  | <i>Manage Roadside Data Collection</i>                       |   | 8.9     |
| <b>9</b> | <b>Manage Maintenance and Construction</b>       |  |   |         |
|          | 9.1  | <i>Manage Maintenance and Construction Vehicles</i>          |   |         |
|          |  | 9.1.1  | Manage M&C Systems On-Board                       | 9.1.1   |
|          |  | 9.1.2  | Collect M&C Vehicle Data On-Board                 | 9.1.2   |
|          |  | 9.1.3  | Track M&C Vehicles and Equipment                  | 9.1.3   |
|          |  | 9.1.4  | Manage M&C Vehicle Fleet                          | 9.1.4   |
|          |  | 9.1.5  | Schedule M&C Vehicle Maint                        | 9.1.5   |
|          |  | 9.1.6  | Provide M&C Vehicle Operator Interface for Maint  | 9.1.6   |
|          |  | 9.1.7  | Process Road Network Information                  | 9.1.7   |

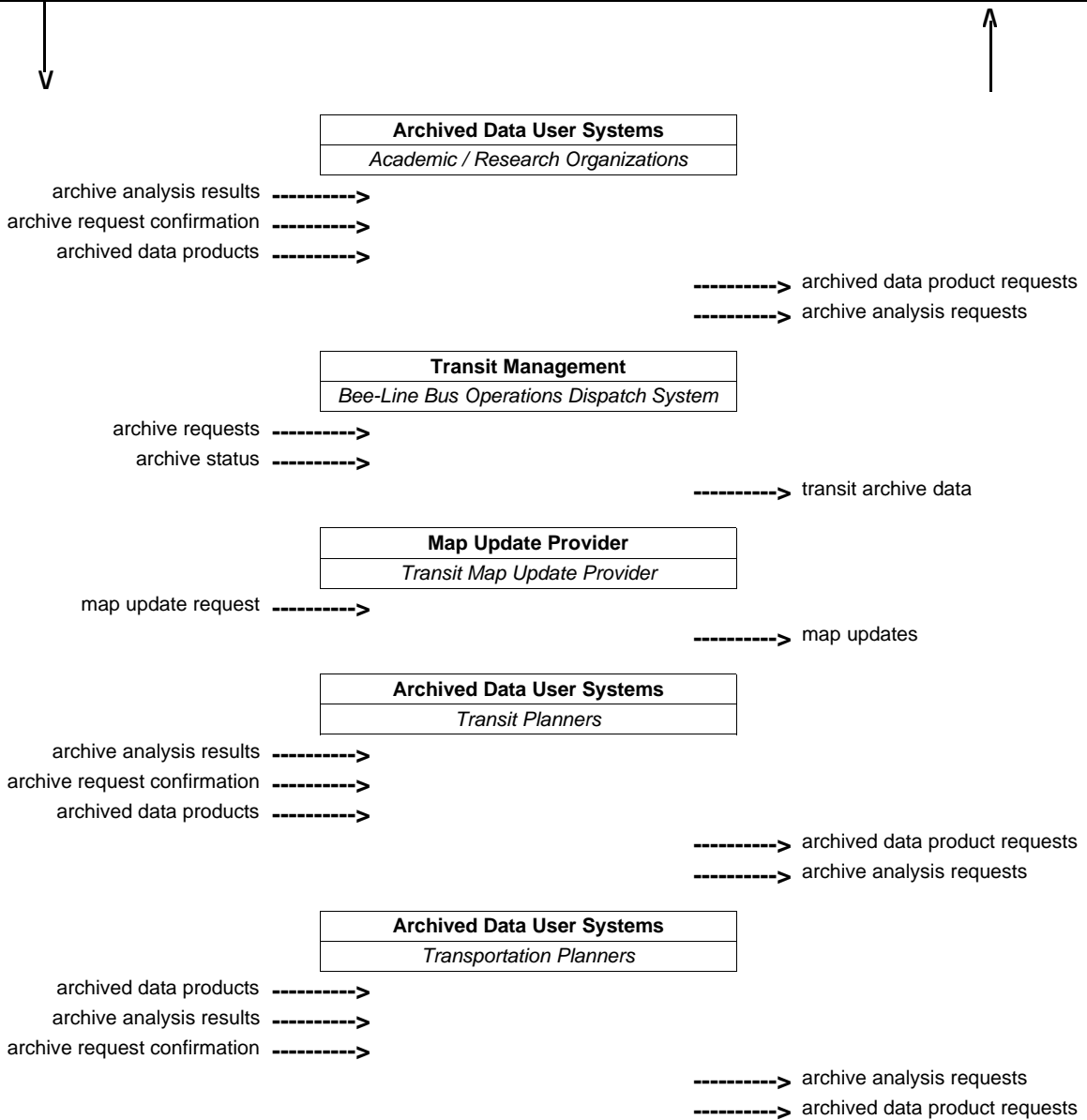
| FUNCTION |  |   |  | PSPEC   |
|----------|--|---|--|---------|
| 9.2      | <i>Manage Roadway M&amp;C Activities</i> |   |  |         |
|          | 9.2.1                                    | Schedule M&C Activities                                     |  | 9.2.1   |
|          | 9.2.2                                    | Status Current M&C Activities                               |  | 9.2.2   |
|          | 9.2.3                                    | Determine M&C Needs   |  |         |
|          |  | 9.2.3.1   | Determine Winter Roadway Treatment Needs             | 9.2.3.1 |
|          |  | 9.2.3.2   | Determine Roadway M&C Needs                          | 9.2.3.2 |
|          |  | 9.2.3.3   | Provide Maintenance Decision Support                 | 9.2.3.3 |
|          |  | 9.2.3.4   | Manage M&C Resource Needs                            | 9.2.3.4 |
|          |  | 9.2.3.5   | Collect Roadside Equipment Status                    | 9.2.3.5 |
|          | 9.2.4                                    | <u>Manage M&amp;C Map Data</u>                              |  | 9.2.4   |
|          | 9.2.5                                    | <u>Provide M&amp;C Center Personnel Interface for Maint</u> |  | 9.2.5   |
|          | 9.2.6                                    | <u>Manage Infrastructure Monitoring and Treatment</u>       |  |         |
|          |  | 9.2.6.3   | Operate Infrastructure Monitoring Devices            | 9.2.6.3 |
|          |  | 9.2.7   | Manage M&C Archive Data                              | 9.2.7   |
|          |  | 9.2.8   | Manage M&C Materials                                 | 9.2.8   |
| 9.3      | <i>Manage Work Zones</i>                 |   |  |         |
|          | 9.3.1                                    | <u>Control Work Zone Activity</u>                           |  |         |
|          |  | 9.3.1.1   | Operate Work Zone Devices                            | 9.3.1.1 |
|          |  | 9.3.1.2   | Operate WZ Devices On-Board                          | 9.3.1.2 |
|          |  | 9.3.1.3   | Monitor Crew Movement                                | 9.3.1.3 |
|          |  | 9.3.1.4   | Monitor Crew Movement On-Board                       | 9.3.1.4 |
|          | 9.3.2                                    | <u>Manage Work Zone Data</u>                                |  |         |
|          |  | 9.3.2.1   | Status Work Zone Activity                            | 9.3.2.1 |
|          |  | 9.3.2.2   | Collect Work Zone Data                               | 9.3.2.2 |
|          |  | 9.3.2.3   | Generate Work Zone Information for Distribution      | 9.3.2.3 |
|          |  | 9.3.2.4   | Provide M&C Field Personnel Interface for Work Zones | 9.3.2.4 |
|          | 9.3.3                                    | <u>Manage Vehicle Speed</u>                                 |  |         |
|          |  | 9.3.3.1   | Collect Vehicle Speed                                | 9.3.3.1 |
|          |  | 9.3.3.2   | Monitor Vehicle Speed in Work Zone                   | 9.3.3.2 |
|          |  | 9.3.3.3   | Monitor Vehicle Speed on Roadway                     | 9.3.3.3 |
|          |  | 9.3.3.4   | Support Vehicle Speed Enforcement                    | 9.3.3.4 |
|          | 9.3.4                                    | <u>Manage WZ Intrusion Warning</u>                          |  |         |
|          |  | 9.3.4.1   | Detect Work Zone Intrusion                           | 9.3.4.1 |
|          |  | 9.3.4.2   | Provide Work Zone Intrusion Alert                    | 9.3.4.2 |
|          |  | 9.3.4.3   | Detect Work Zone Intrusion On-Board                  | 9.3.4.3 |

| FUNCTION |     |   |   | PSPEC   |
|----------|-----|---|---|---------|
|          |     | 9.3.4.4                                 | Provide On-Board Work Zone Intrusion Alert                        | 9.3.4.4 |
|          | 9.4 | <i>Manage Environmental Information</i> |   |         |
|          |     | 9.4.2                                   | <u>Collect Environmental Data</u>                                 | 9.4.2   |
|          |     | 9.4.3                                   | <u>Process Environmental Data</u>                                 | 9.4.3   |
|          |     | 9.4.4                                   | <u>Disseminate Environmental Information</u>                      | 9.4.4   |
|          |     | 9.4.5                                   | <u>Provide M&amp;C Center Personnel Interface for Environment</u> | 9.4.5   |

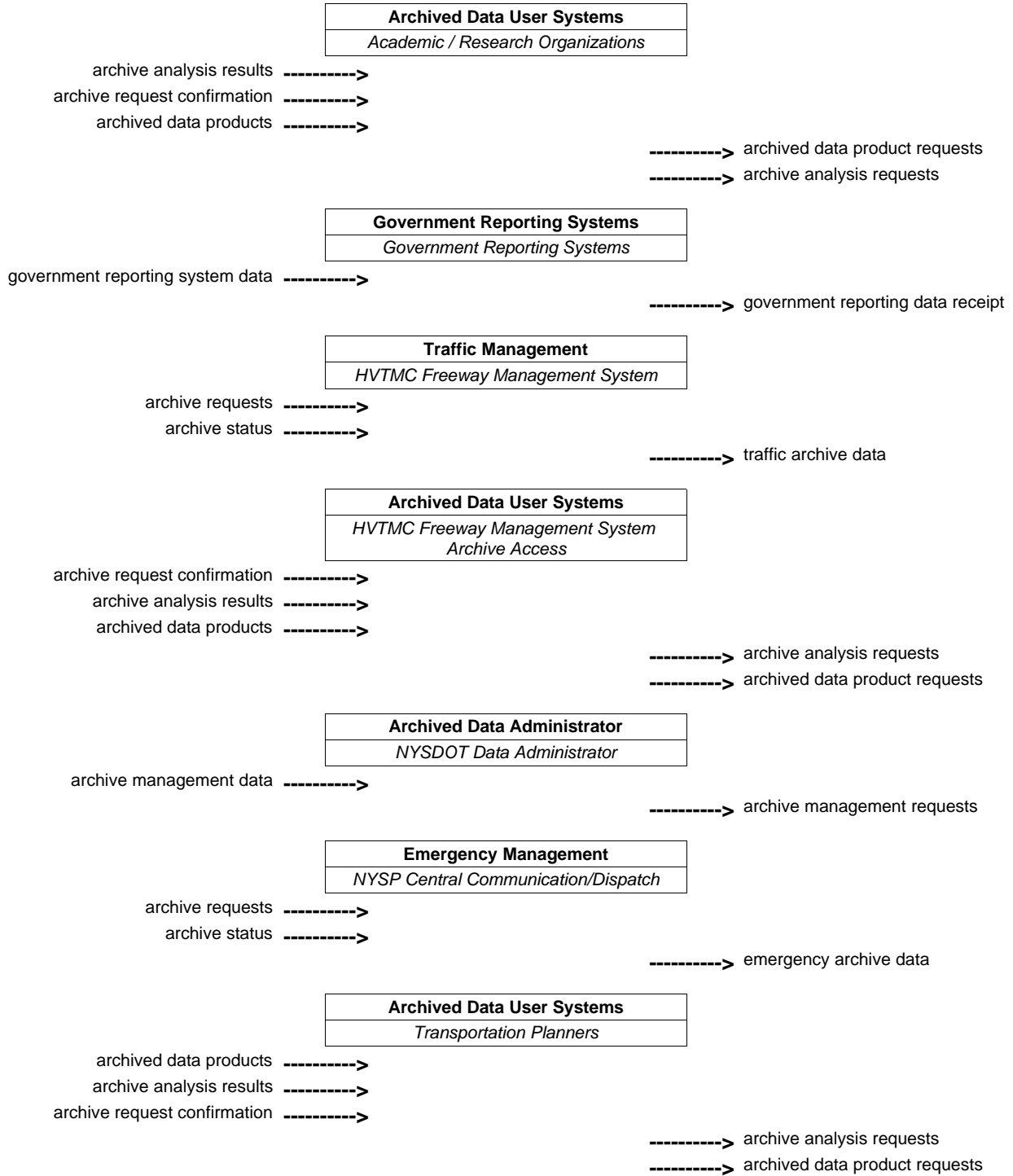
## 5 ORGANIZATIONAL CONNECTIVITY

The organizational connectivity for the Regional ITS identifies the interconnections between subsystems and terminators. Each line connecting the various entities represents information exchanges between the entities. These exchanges are further detailed through architecture flows, data flows, and data stores. Each box represents a specific system extracted from the systems inventory. The associated arrows represent the architecture flows between the subsystems and/or terminators. Pages 5-2 through 5-146 show diagrams of the major subsystems of the region and their associated architecture flows.

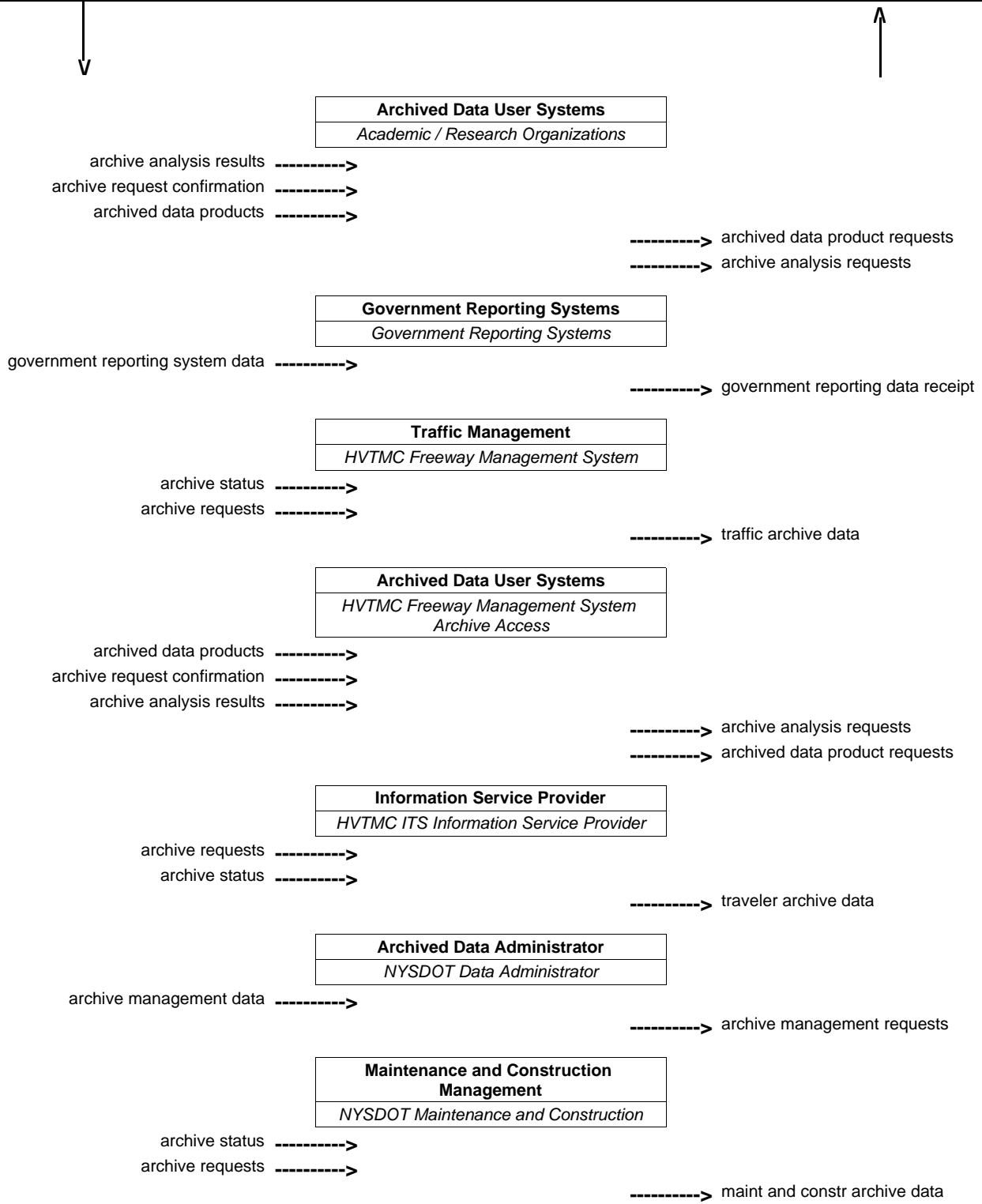
|   |
|---|
| <b>Archived Data Management Subsystem</b> |
| <i>Bee-Line Data Management System</i>    |



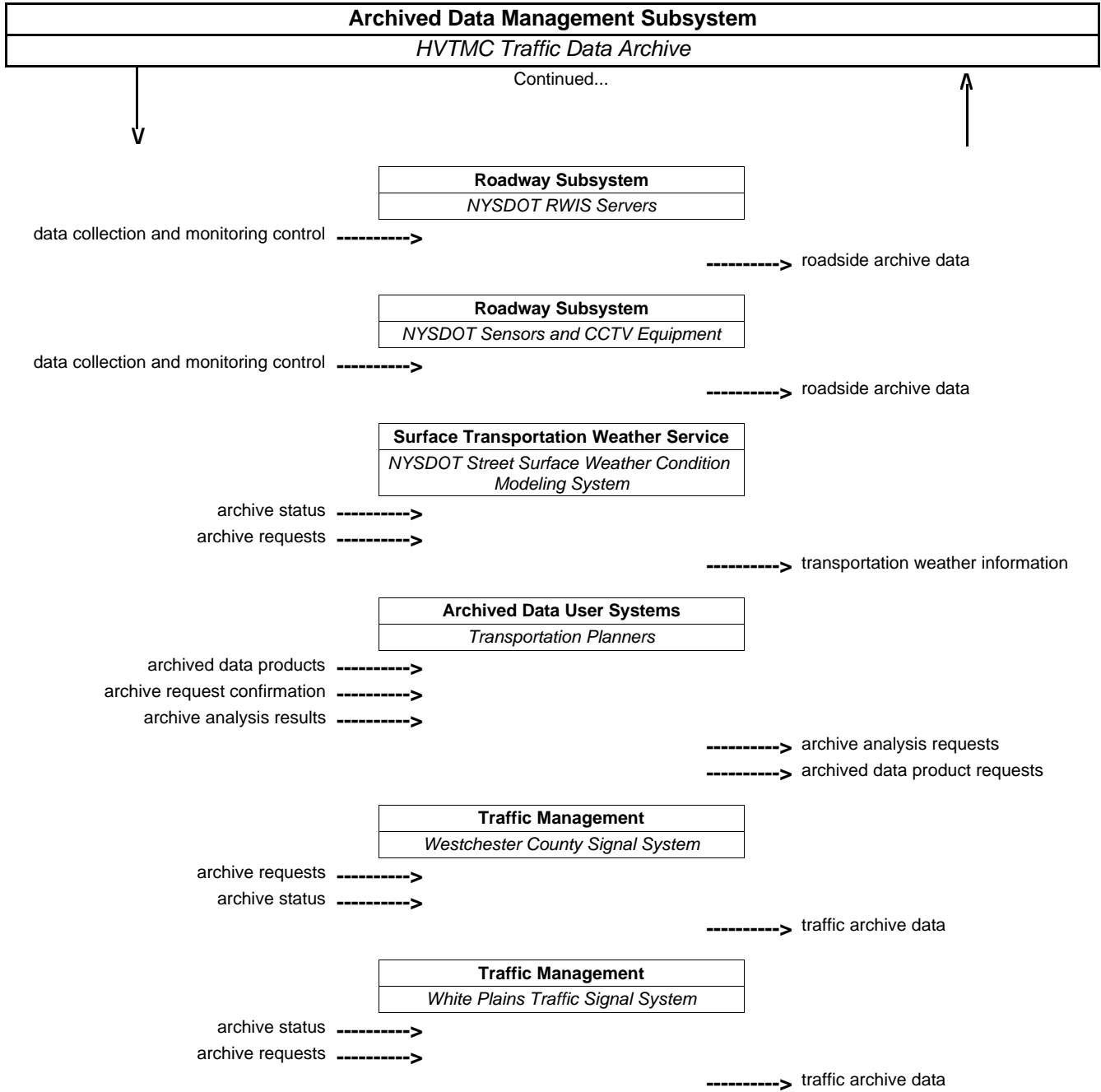
|   |
|---|
| <b>Archived Data Management Subsystem</b> |
| <i>HVTMC Incident Data Archive</i>        |



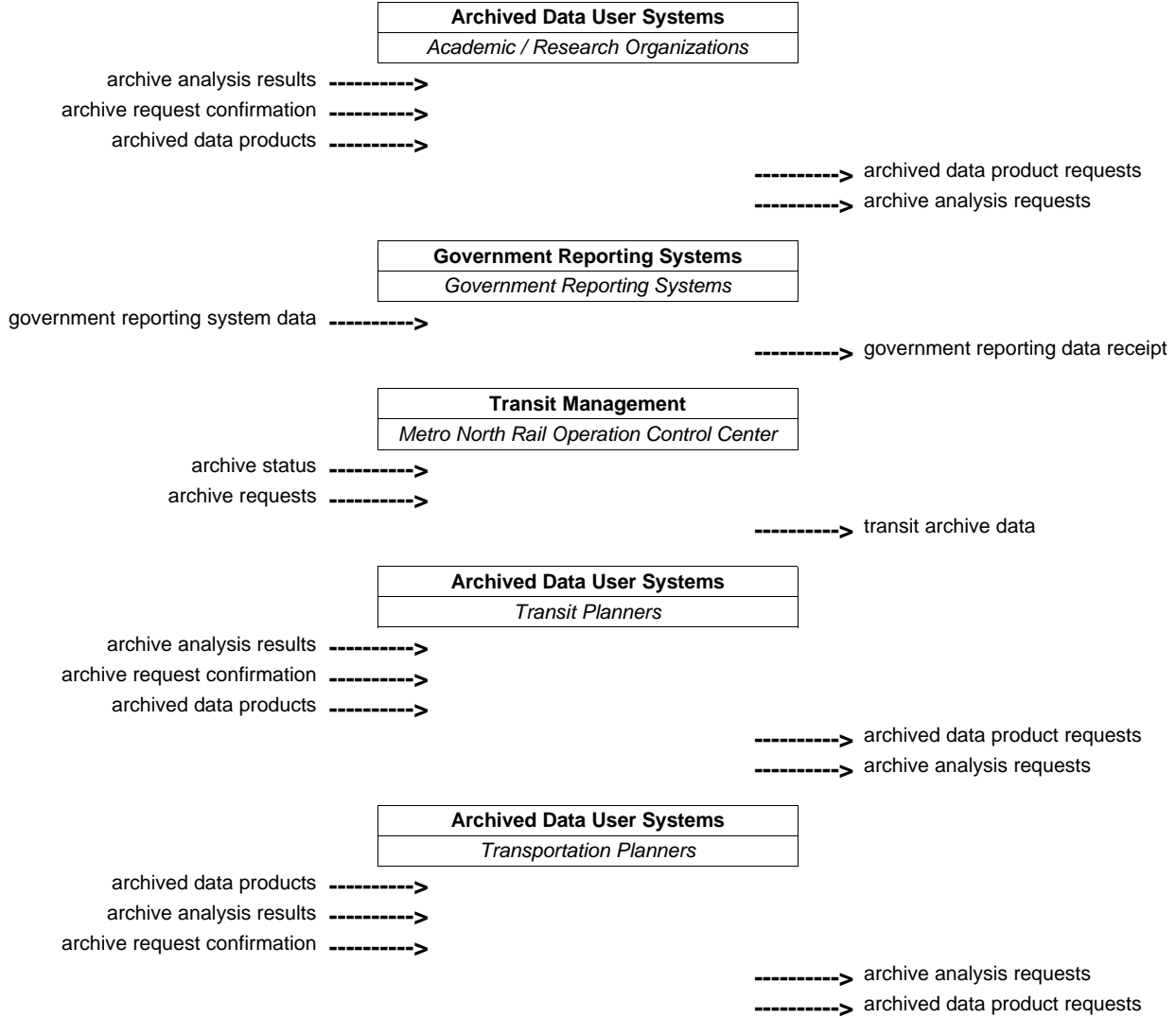
|   |
|---|
| <b>Archived Data Management Subsystem</b> |
| <i>HVTMC Traffic Data Archive</i>         |



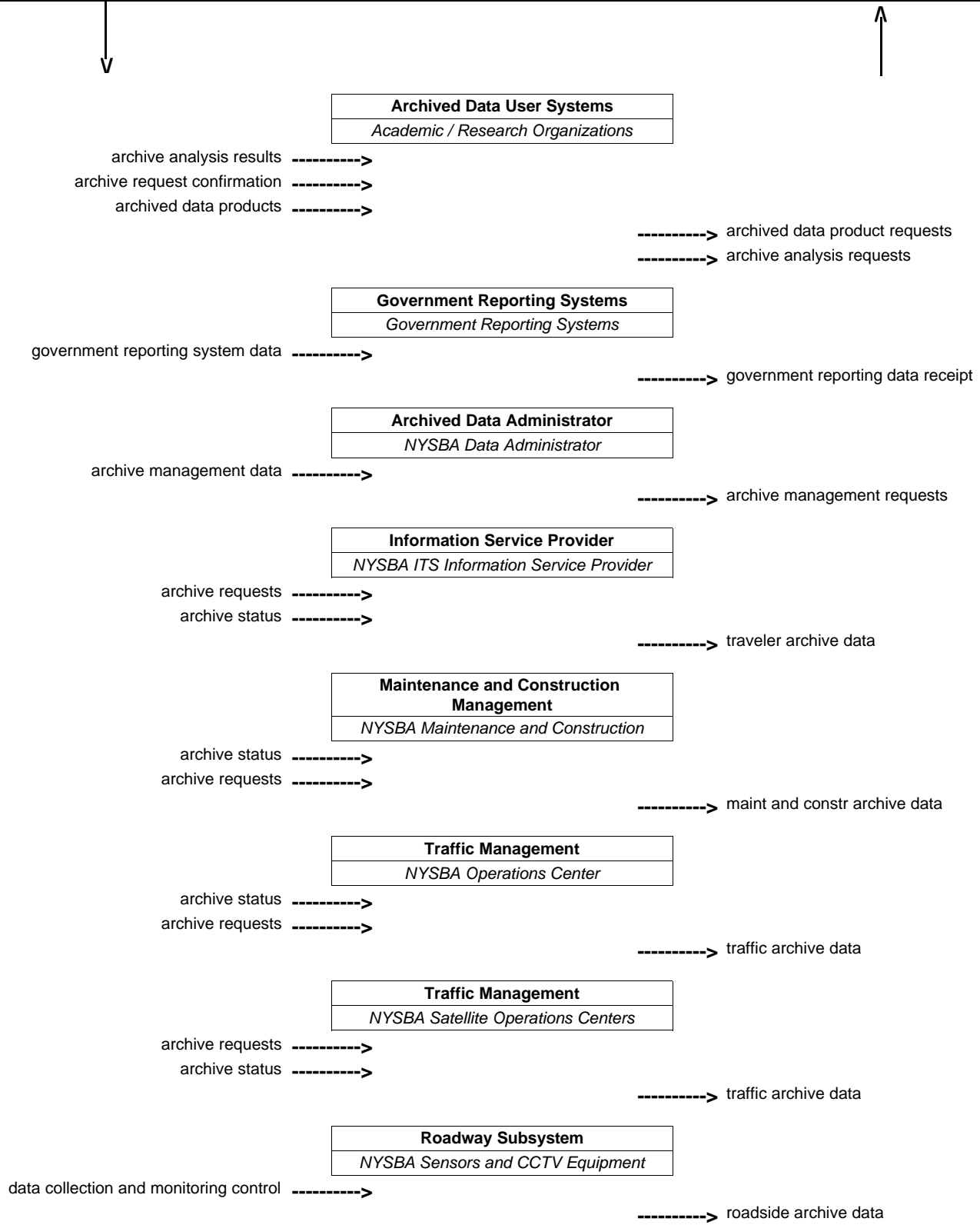




|   |
|---|
| <b>Archived Data Management Subsystem</b> |
| <i>Metro North Data Management System</i> |



|   |
|---|
| <b>Archived Data Management Subsystem</b> |
| <i>NYSBA Toll Archive System</i>          |



**Archived Data Management Subsystem**  
*NYSBA Toll Archive System*

Continued...



**Toll Administration**  
*NYSBA Toll Operations*

archive status ----->  
 archive requests ----->

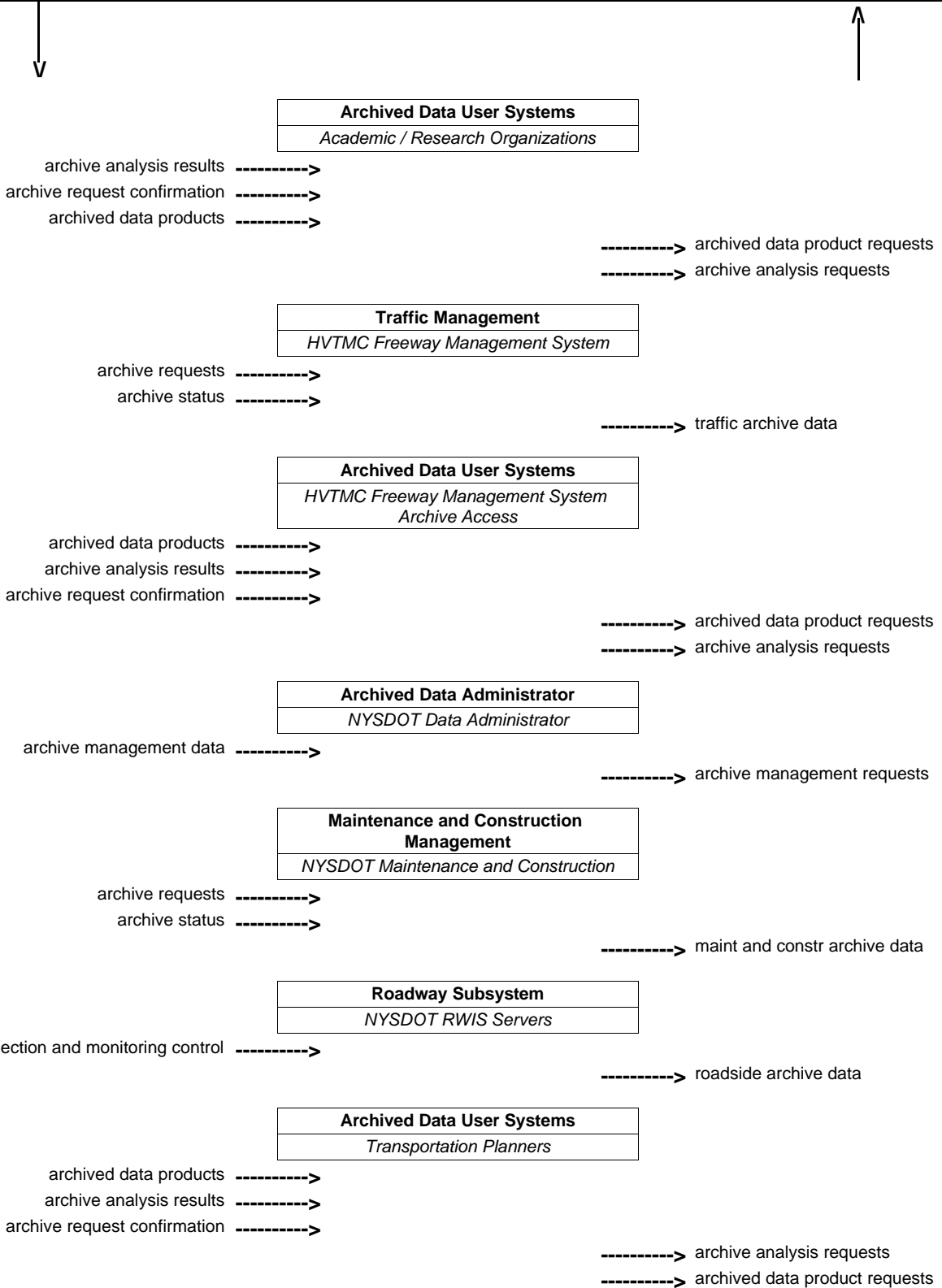
-----> toll archive data

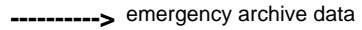
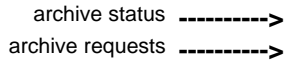
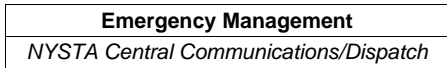
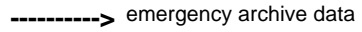
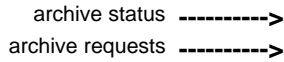
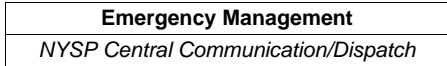
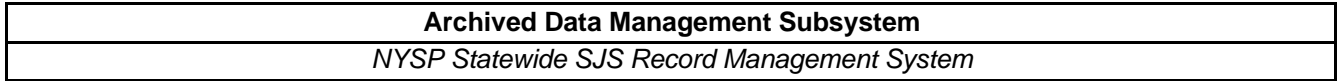
**Archived Data User Systems**  
*Transportation Planners*

archived data products ----->  
 archive analysis results ----->  
 archive request confirmation ----->

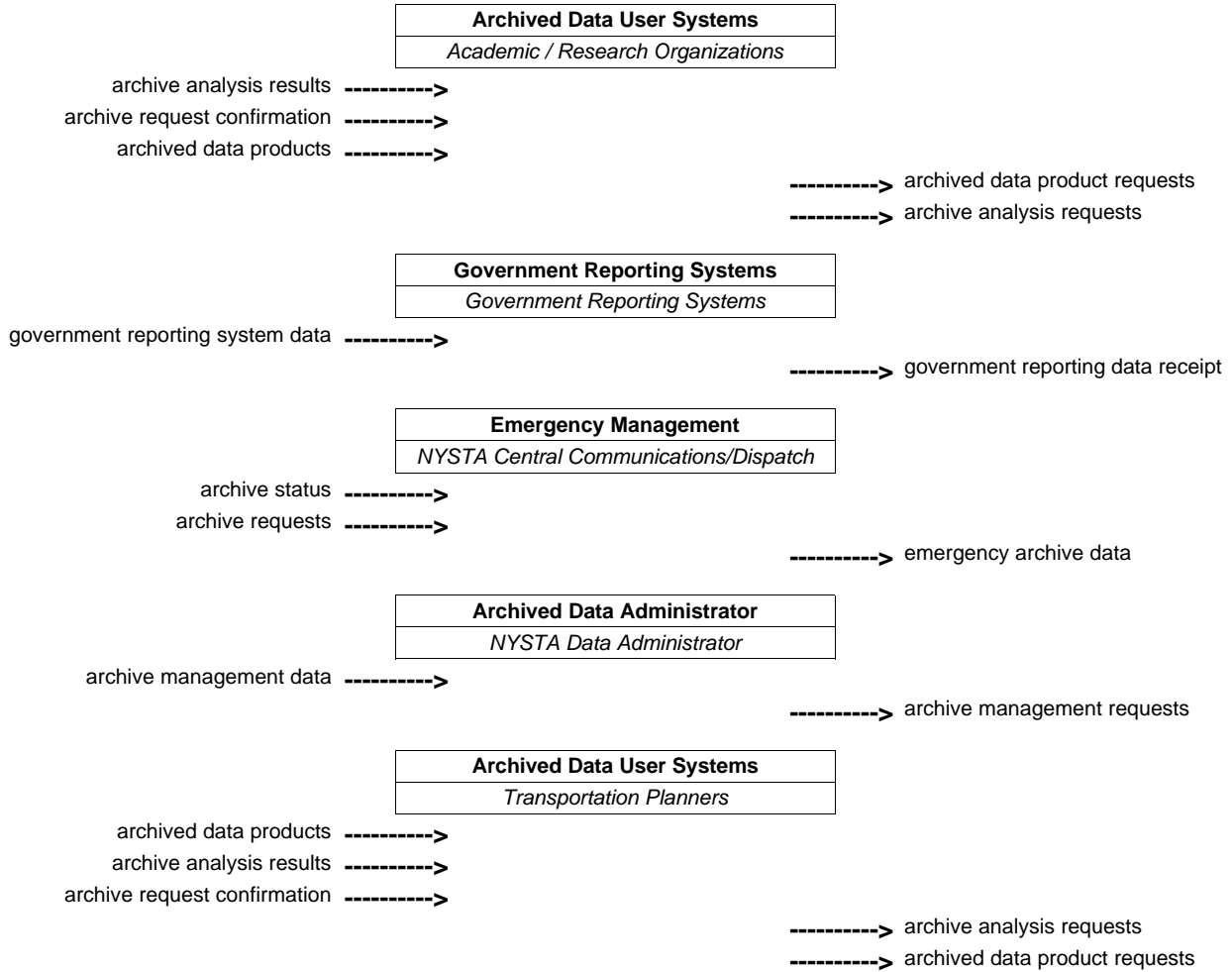
-----> archive analysis requests  
 -----> archived data product requests

|   |
|---|
| <b>Archived Data Management Subsystem</b>   |
| <i>NYSDOT Maintenance Management System</i> |

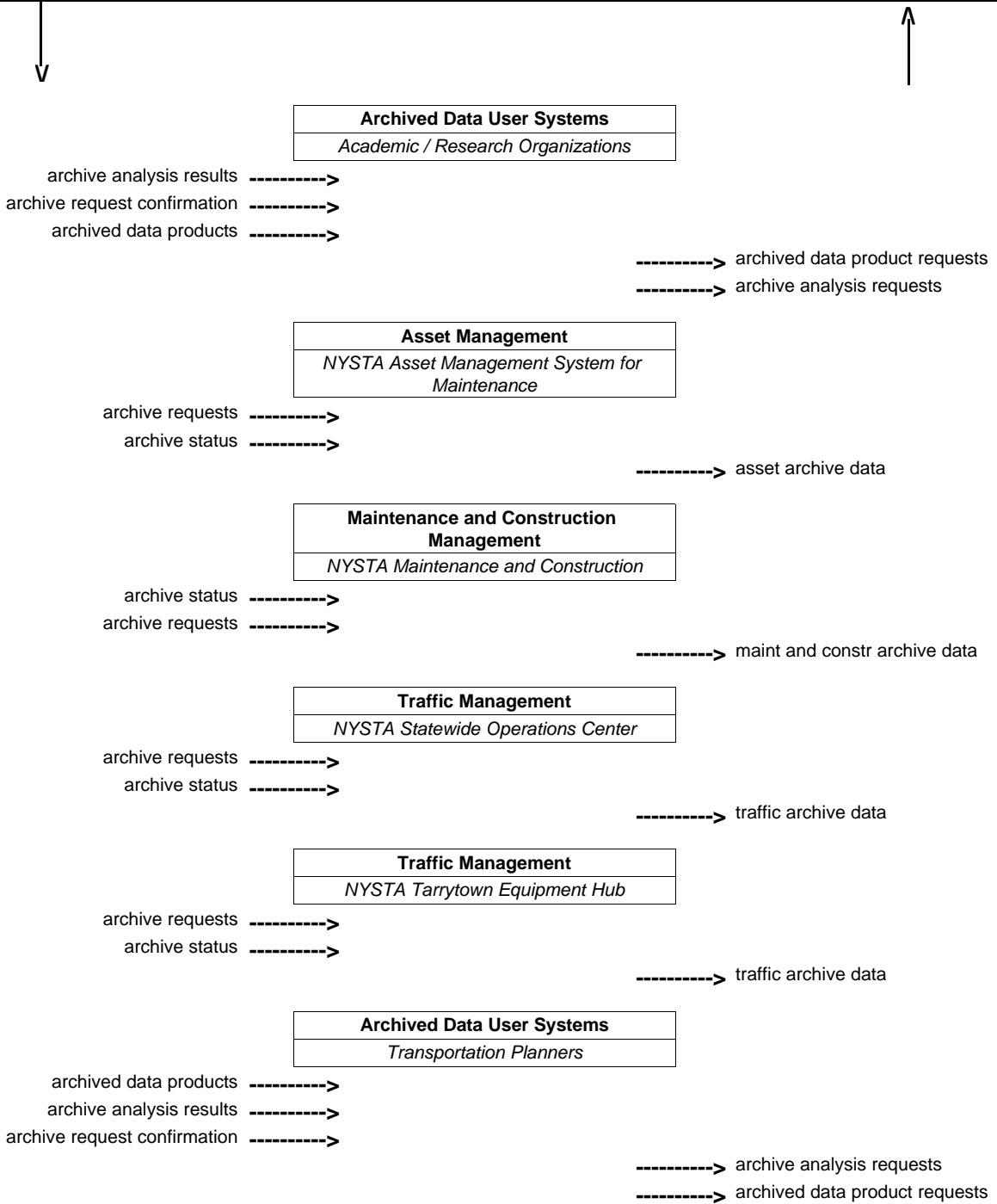




|   |
|---|
| <b>Archived Data Management Subsystem</b> |
| <i>NYSTA Incident Data Archive</i>        |

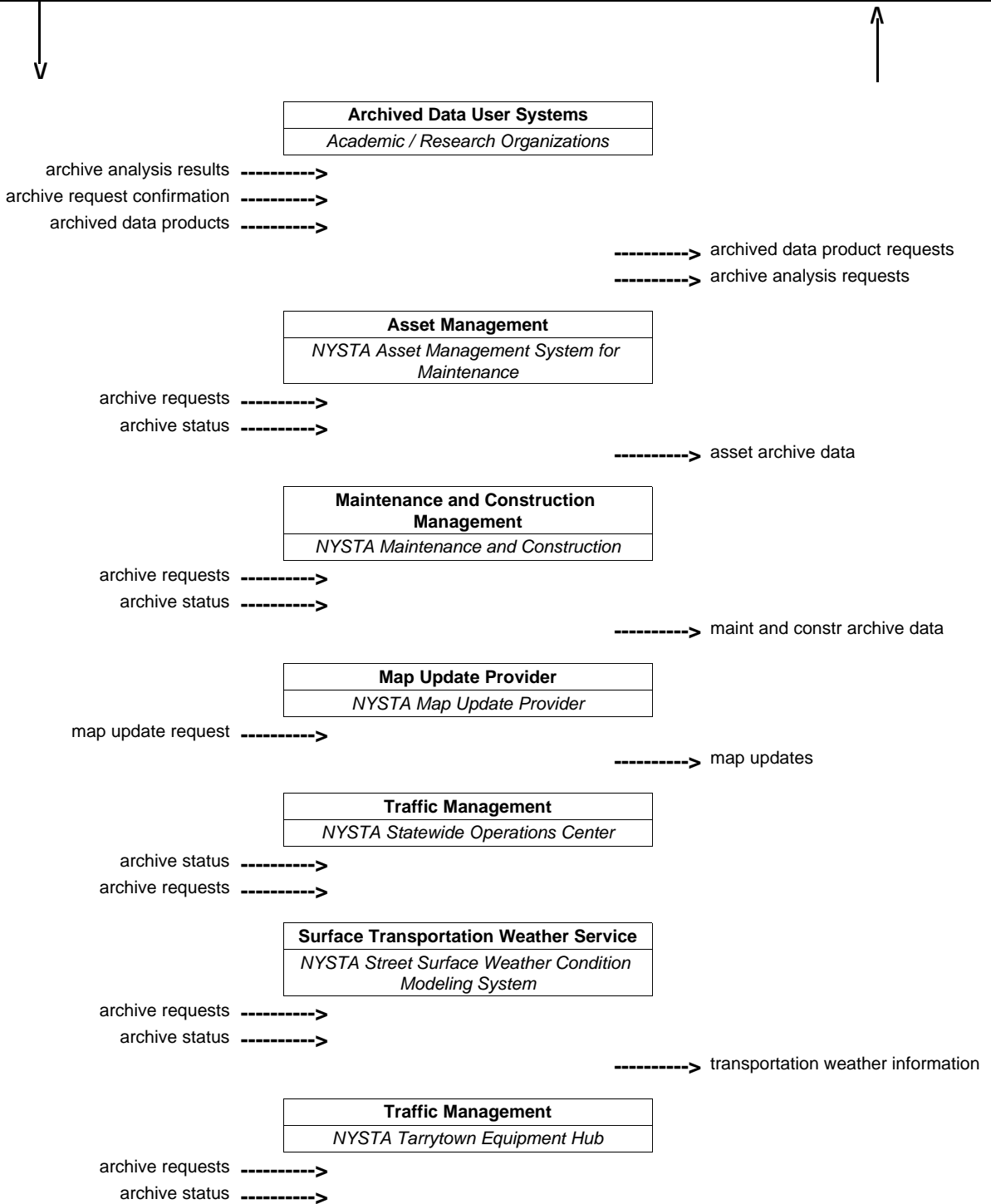


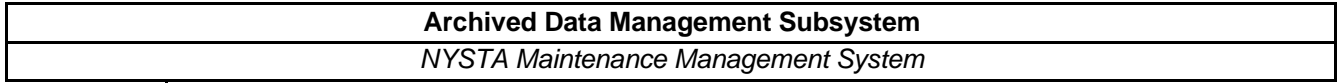
|   |
|---|
| <b>Archived Data Management Subsystem</b>                   |
| <i>NYSTA Infrastructure Inventory and Inspection System</i> |



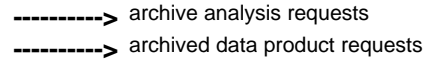
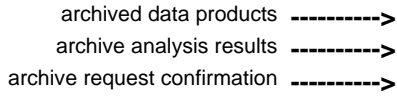
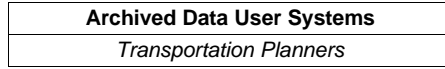


|  |
|--|
| <b>Archived Data Management Subsystem</b>  |
| <i>NYSTA Maintenance Management System</i> |

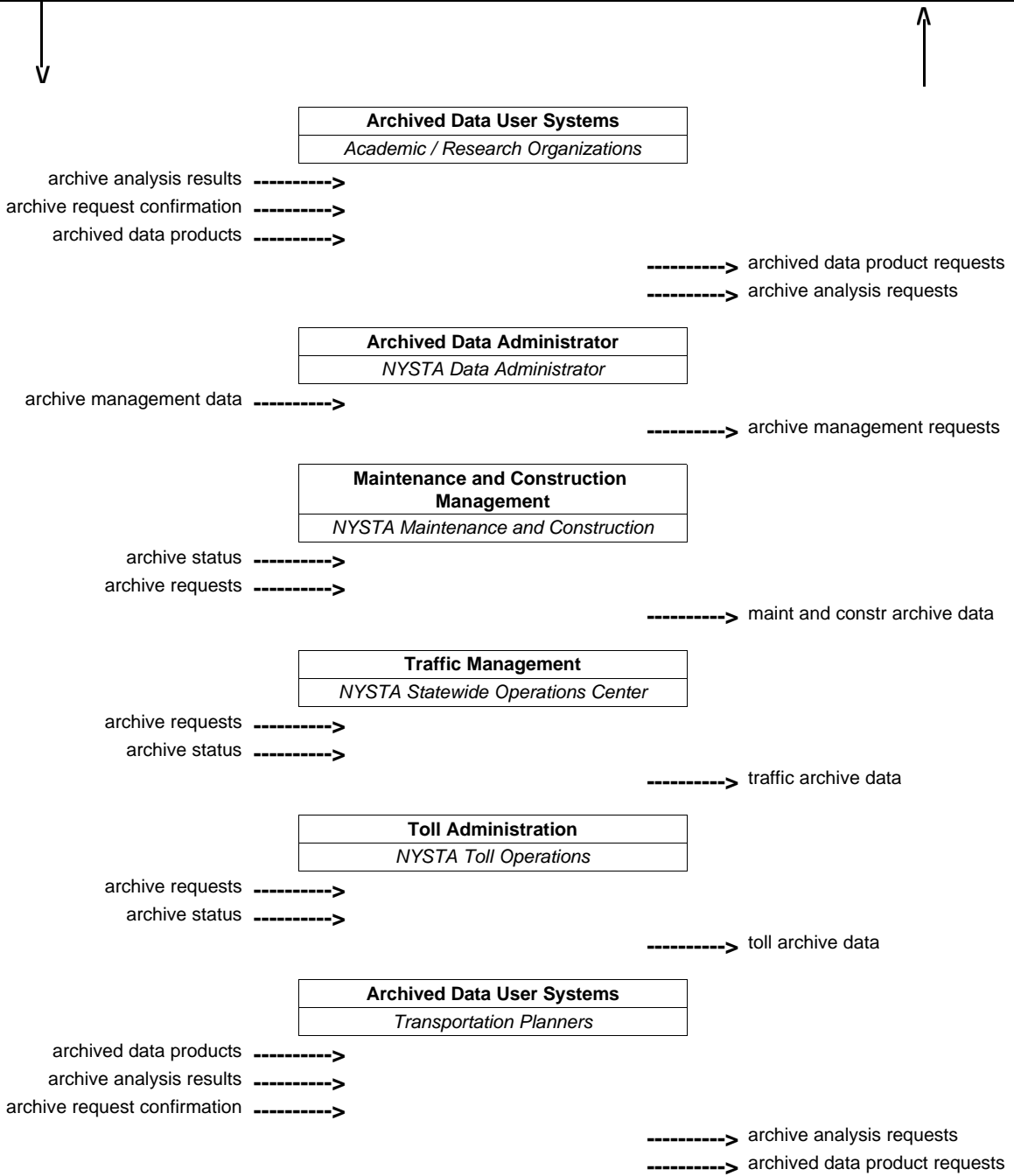




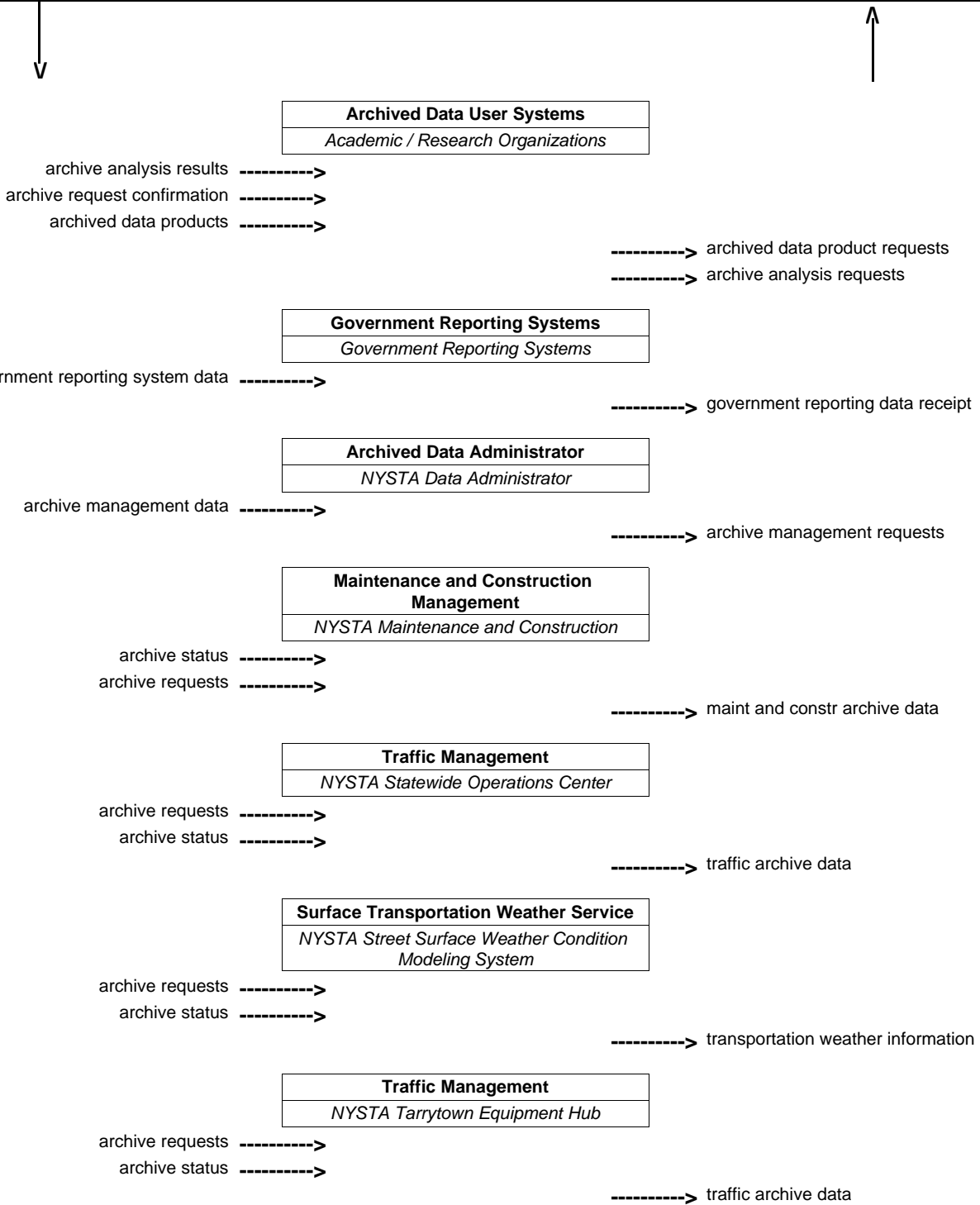
Continued...

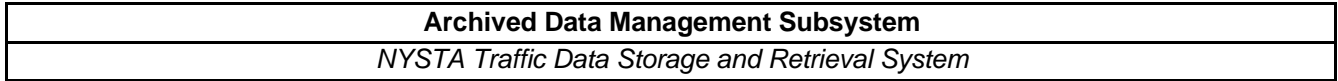


|   |
|---|
| <b>Archived Data Management Subsystem</b> |
| <i>NYSTA Toll Data Storage System</i>     |

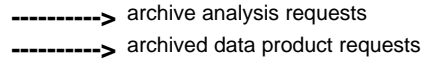
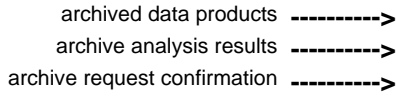
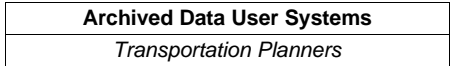


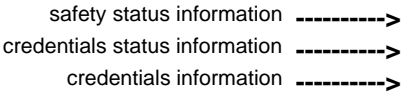
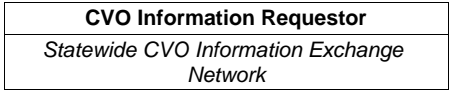
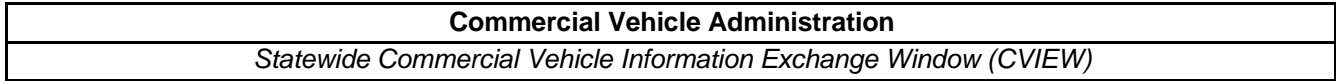
|  |
|--|
| <b>Archived Data Management Subsystem</b>              |
| <i>NYSTA Traffic Data Storage and Retrieval System</i> |

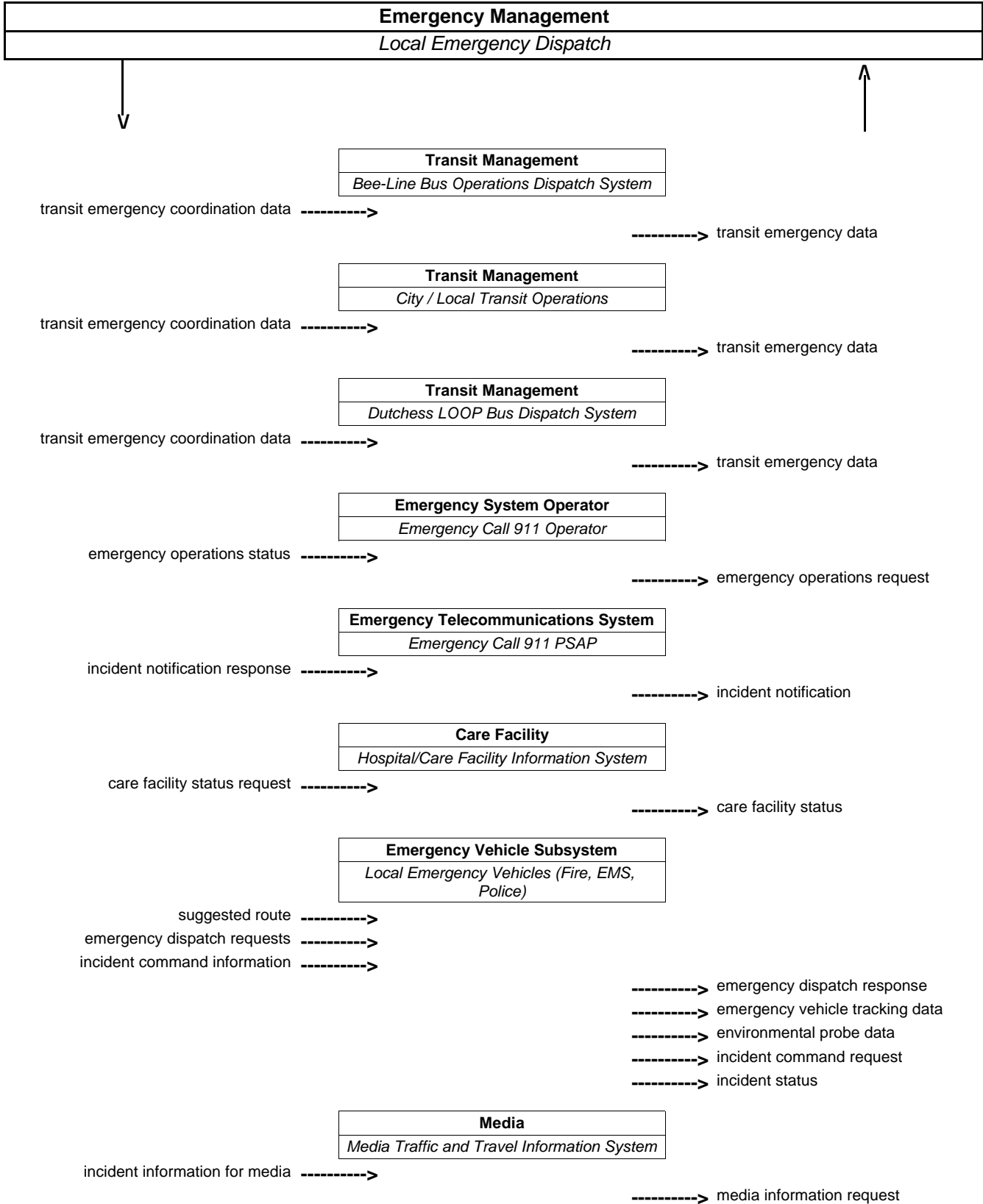


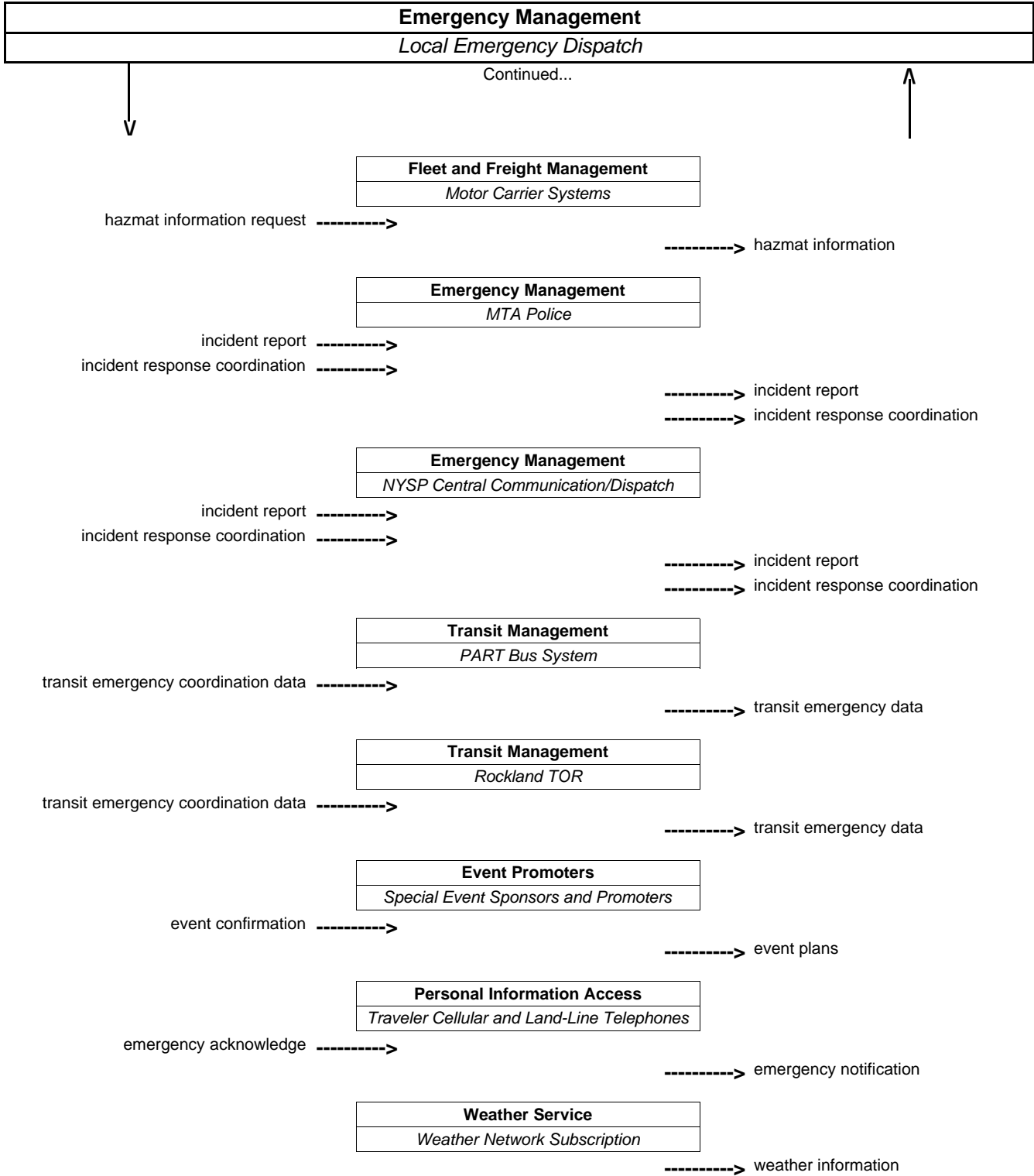


Continued...

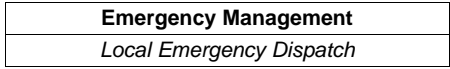
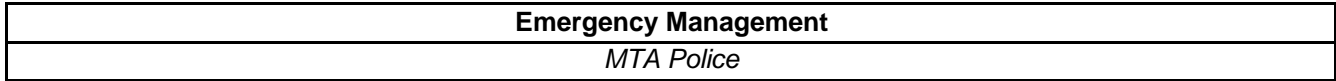












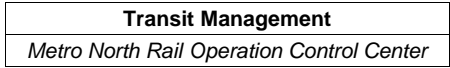
incident response coordination ----->  
 incident report ----->

-----> incident response coordination  
 -----> incident report



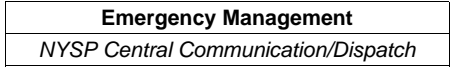
incident information for media ----->

-----> media information request



transit emergency coordination data ----->

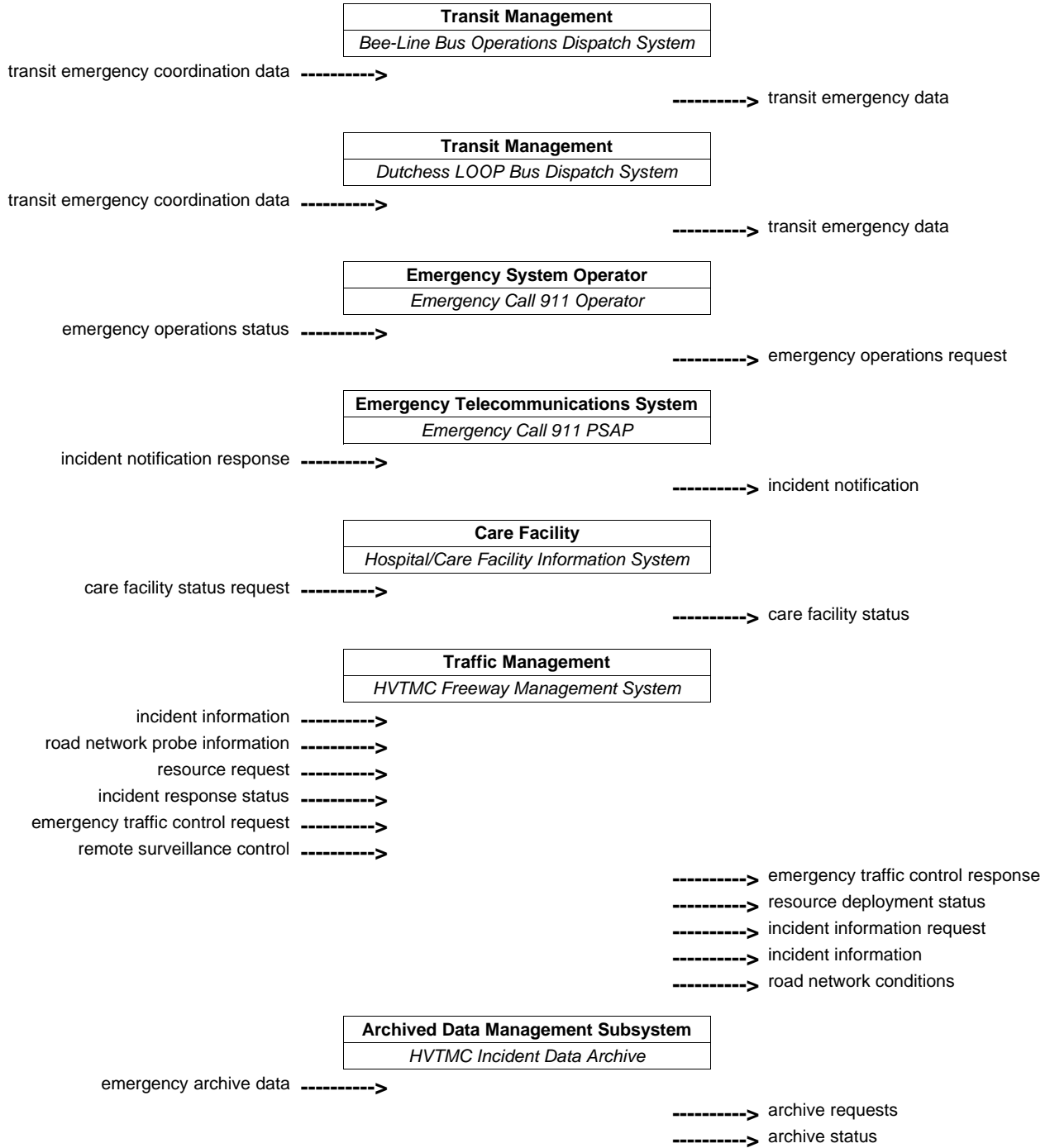
-----> transit emergency data



incident response coordination ----->  
 incident report ----->

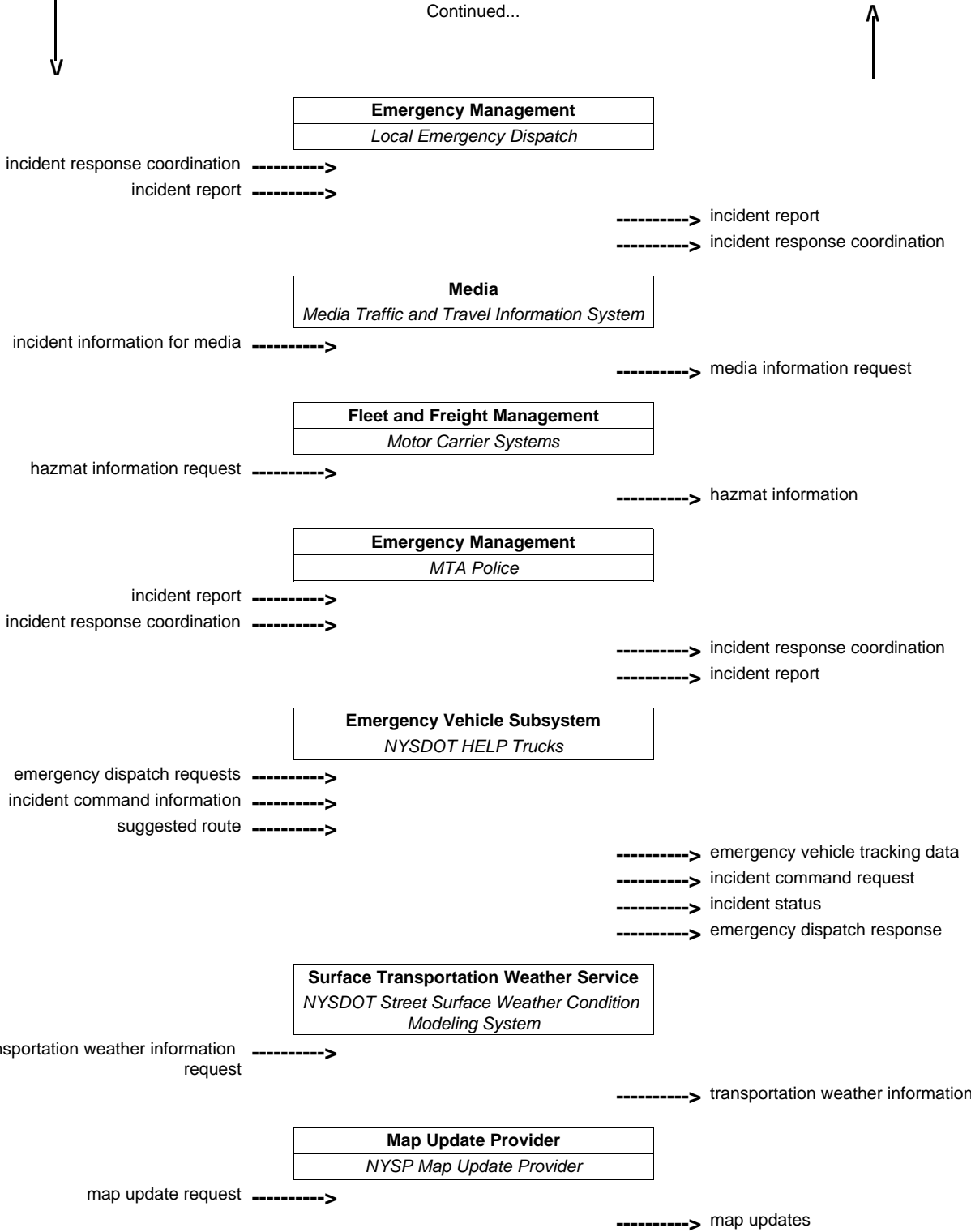
-----> incident response coordination  
 -----> incident report

|  |
|--|
| <b>Emergency Management</b>                |
| <i>NYSP Central Communication/Dispatch</i> |



|  |
|--|
| <b>Emergency Management</b>                |
| <i>NYSP Central Communication/Dispatch</i> |

Continued...



|  |
|--|
| <b>Emergency Management</b>                |
| <i>NYSP Central Communication/Dispatch</i> |

Continued...



|  |
|--|
| <b>Archived Data Management Subsystem</b>          |
| <i>NYSP Statewide SJS Record Management System</i> |

emergency archive data ----->

-----> archive requests  
 -----> archive status

|                                    |
|------------------------------------|
| <b>Emergency Vehicle Subsystem</b> |
| <i>NYSP Vehicles</i>               |

suggested route ----->  
 incident command information ----->  
 emergency dispatch requests ----->

-----> emergency vehicle tracking data  
 -----> environmental probe data  
 -----> incident command request  
 -----> emergency dispatch response  
 -----> incident status

|  |
|--|
| <b>Emergency Management</b>                  |
| <i>NYSTA Central Communications/Dispatch</i> |

incident response coordination ----->  
 incident report ----->

-----> incident report  
 -----> incident response coordination

|                           |
|---------------------------|
| <b>Transit Management</b> |
| <i>PART Bus System</i>    |

transit emergency coordination data ----->

-----> transit emergency data

|                           |
|---------------------------|
| <b>Transit Management</b> |
| <i>Rockland TOR</i>       |

transit emergency coordination data ----->

-----> transit emergency data

|   |
|---|
| <b>Event Promoters</b>                      |
| <i>Special Event Sponsors and Promoters</i> |

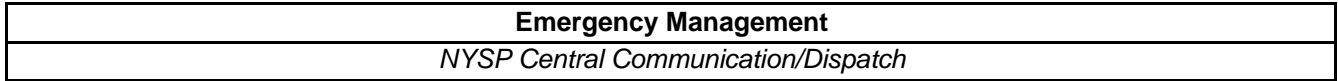
event confirmation ----->

-----> event plans

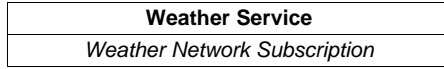
|   |
|---|
| <b>Personal Information Access</b>                |
| <i>Traveler Cellular and Land-Line Telephones</i> |

emergency acknowledge ----->

-----> emergency notification

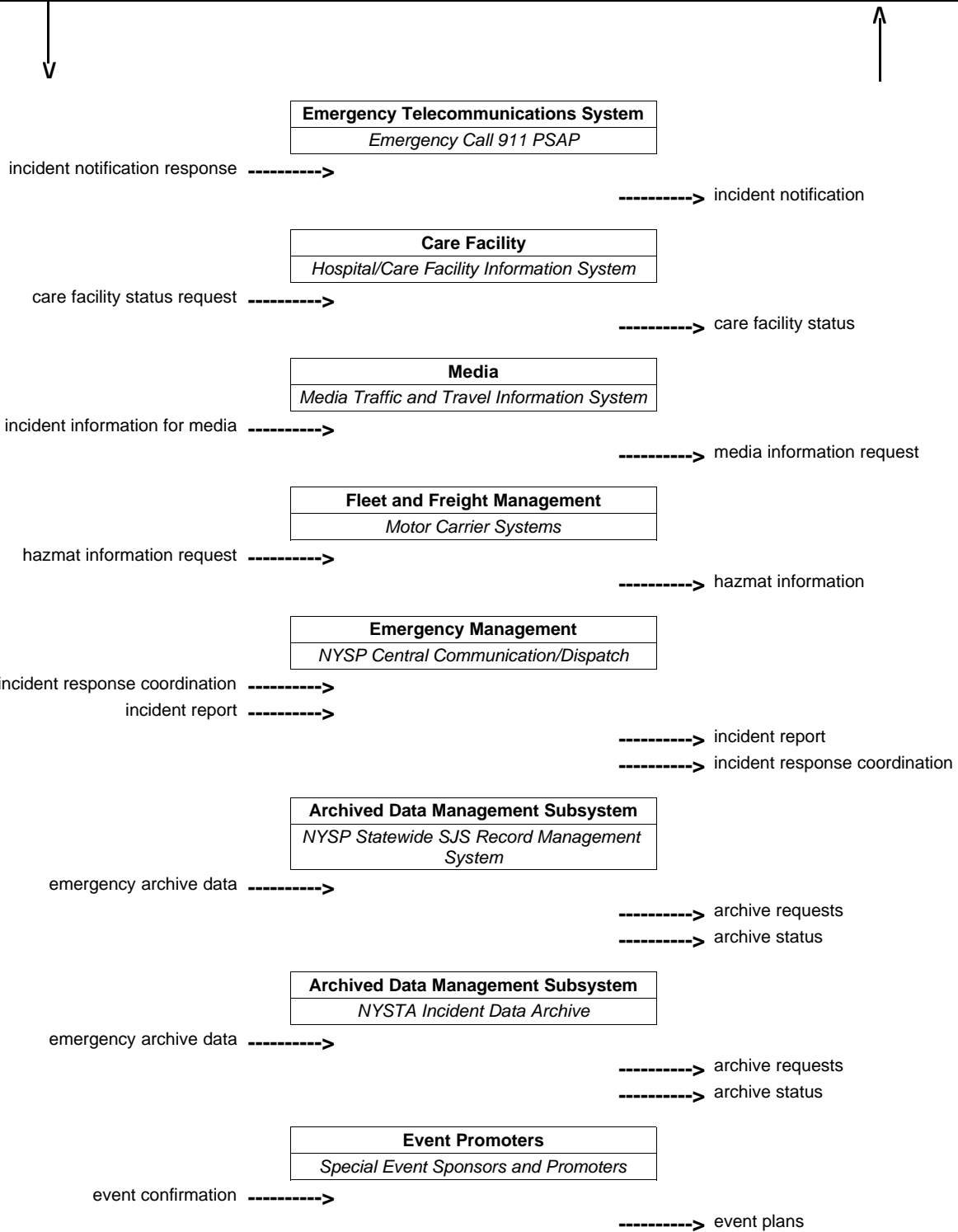


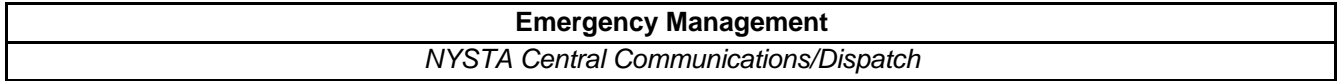
Continued...



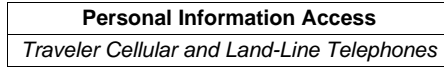
-----> weather information

|  |
|--|
| <b>Emergency Management</b>                  |
| <i>NYSTA Central Communications/Dispatch</i> |





Continued...



emergency acknowledge ----->

-----> emergency notification

**Fleet and Freight Management**  
*Motor Carrier Systems*



**Emergency Management**  
*Local Emergency Dispatch*

hazmat information ----->

-----> hazmat information request

**Emergency Management**  
*NYSP Central Communication/Dispatch*

hazmat information ----->

-----> hazmat information request

**Emergency Management**  
*NYSTA Central Communications/Dispatch*

hazmat information ----->

-----> hazmat information request



|   |
|---|
| <b>Information Service Provider</b>           |
| <i>HVTMC ITS Information Service Provider</i> |



|  |
|--|
| <b>Transit Management</b>                      |
| <i>Bee-Line Bus Operations Dispatch System</i> |

demand responsive transit request ----->  
 selected routes ----->  
 transit information request ----->

-----> transit and fare schedules  
 -----> transit incident information  
 -----> transit request confirmation  
 -----> demand responsive transit plan

|  |
|--|
| <b>Transit Management</b>                |
| <i>Dutchess LOOP Bus Dispatch System</i> |

selected routes ----->  
 transit information request ----->  
 demand responsive transit request ----->

-----> transit incident information  
 -----> transit and fare schedules  
 -----> demand responsive transit plan  
 -----> transit request confirmation

|   |
|---|
| <b>Multimodal Transportation Service Provider</b> |
| <i>Ferrys, Airports etc Information Systems</i>   |

multimodal information request ----->

-----> multimodal information

|  |
|--|
| <b>Traffic Management</b>              |
| <i>HVTMC Freeway Management System</i> |

fare and price information ----->  
 road network probe information ----->  
 request for road network conditions ----->  
 logged special vehicle route ----->

-----> request fare and price information  
 -----> road network conditions

|   |
|---|
| <b>Archived Data Management Subsystem</b> |
| <i>HVTMC Traffic Data Archive</i>         |

traveler archive data ----->

-----> archive requests  
 -----> archive status

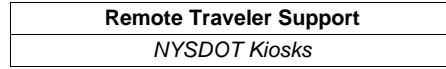
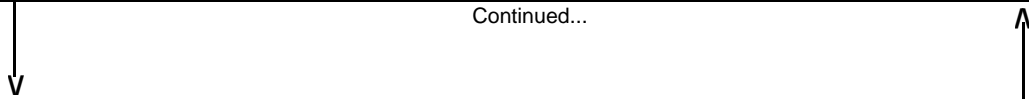
|  |
|--|
| <b>Media</b>                                       |
| <i>Media Traffic and Travel Information System</i> |

traveler information for media ----->

-----> external reports  
 -----> media information request

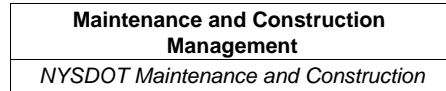


Continued...



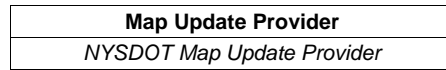
- broadcast information ----->
- traveler information ----->
- trip plan ----->
- yellow pages information ----->

- > traveler request
- > trip confirmation
- > trip request
- > yellow pages request



road network probe information ----->

- > maint and constr work plans
- > work zone information
- > road weather information
- > current asset restrictions
- > roadway maintenance status



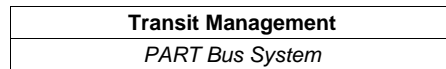
map update request ----->

-----> map updates



ISP coordination ----->

-----> ISP coordination

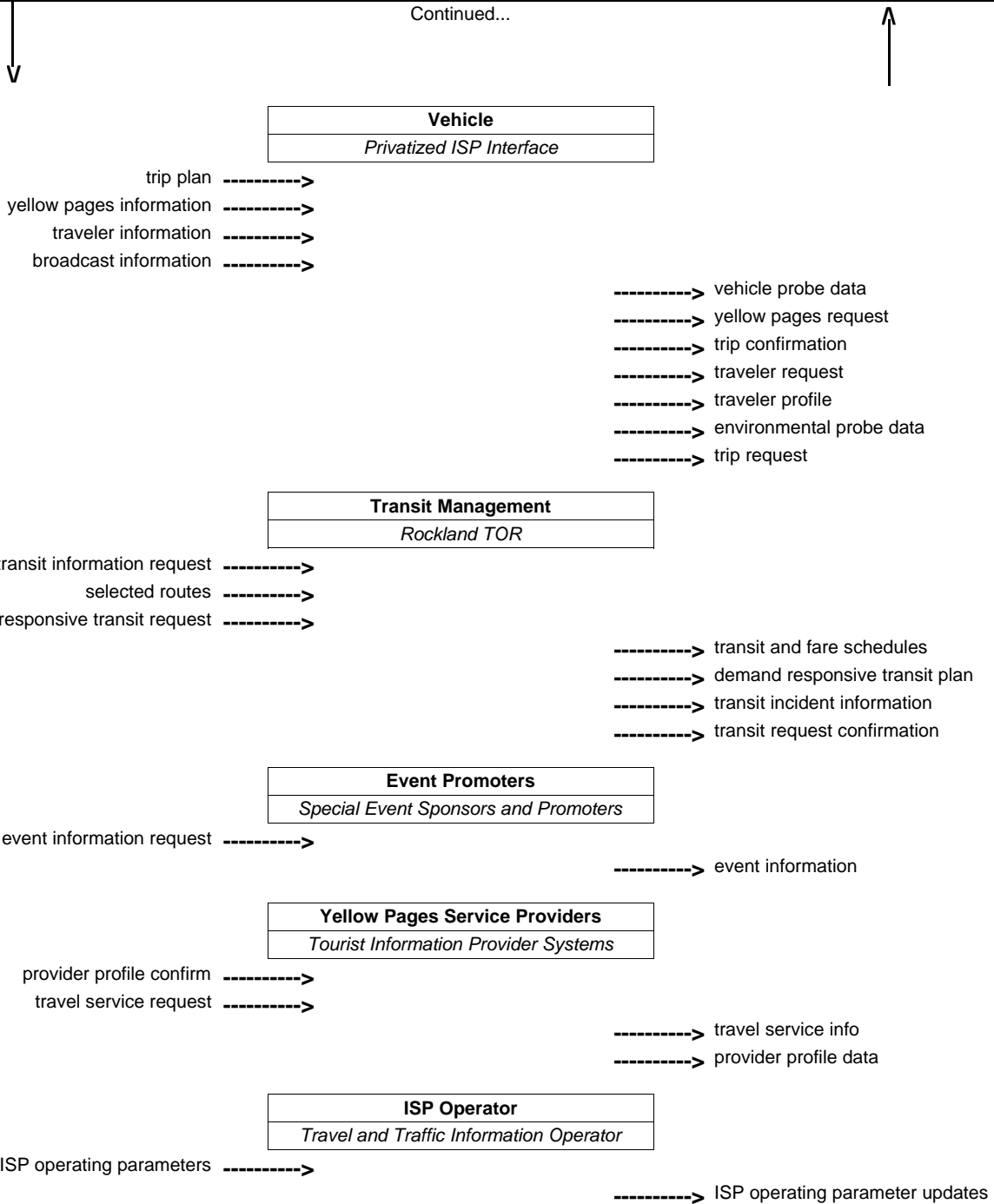


- transit information request ----->
- selected routes ----->
- demand responsive transit request ----->

- > transit request confirmation
- > demand responsive transit plan
- > transit incident information
- > transit and fare schedules

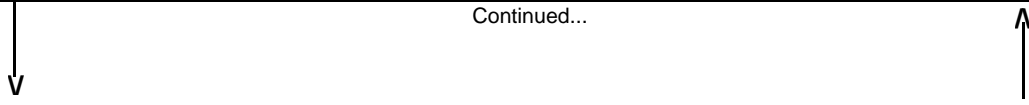
|   |
|---|
| <b>Information Service Provider</b>           |
| <i>HVTMC ITS Information Service Provider</i> |

Continued...



|   |
|---|
| <b>Information Service Provider</b>           |
| <i>HVTMC ITS Information Service Provider</i> |

Continued...



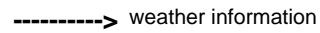
|   |
|---|
| <b>Personal Information Access</b>                |
| <i>Traveler Cellular and Land-Line Telephones</i> |

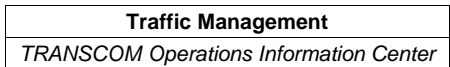
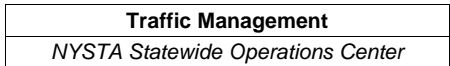
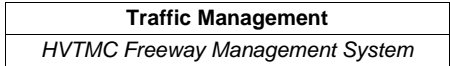


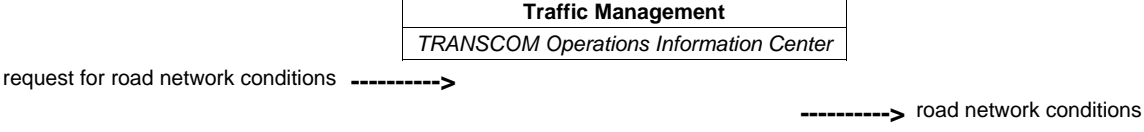
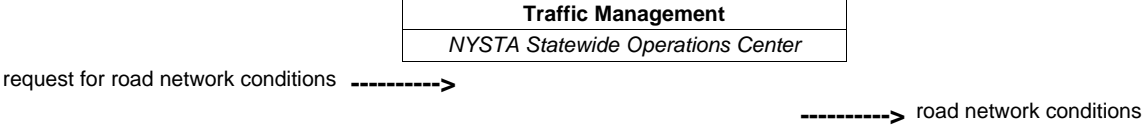
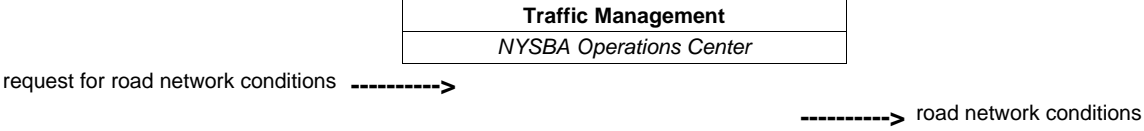
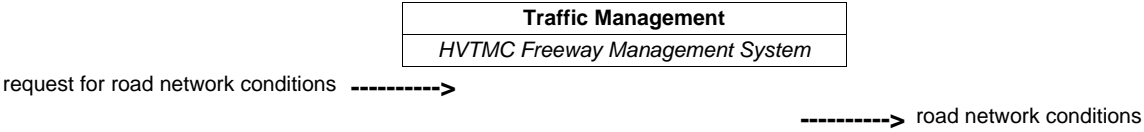
|                                    |
|------------------------------------|
| <b>Personal Information Access</b> |
| <i>Traveler PC/Info. Appliance</i> |



|                                     |
|-------------------------------------|
| <b>Weather Service</b>              |
| <i>Weather Network Subscription</i> |







|   |
|---|
| <b>Information Service Provider</b>           |
| <i>NYSBA ITS Information Service Provider</i> |



|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYSBA Maintenance and Construction</i>      |

road network probe information ----->

- > maint and constr work plans
- > road weather information
- > roadway maintenance status
- > work zone information
- > current asset restrictions

|                                |
|--------------------------------|
| <b>Traffic Management</b>      |
| <i>NYSBA Operations Center</i> |

- fare and price information ----->
- logged special vehicle route ----->
- request for road network conditions ----->
- road network probe information ----->

- > request fare and price information
- > road network conditions

|   |
|---|
| <b>Traffic Management</b>                 |
| <i>NYSBA Satellite Operations Centers</i> |

- road network probe information ----->
- fare and price information ----->
- request for road network conditions ----->
- logged special vehicle route ----->

- > road network conditions
- > request fare and price information

|   |
|---|
| <b>Archived Data Management Subsystem</b> |
| <i>NYSBA Toll Archive System</i>          |

traveler archive data ----->

- > archive requests
- > archive status

|                              |
|------------------------------|
| <b>Toll Administration</b>   |
| <i>NYSBA Toll Operations</i> |

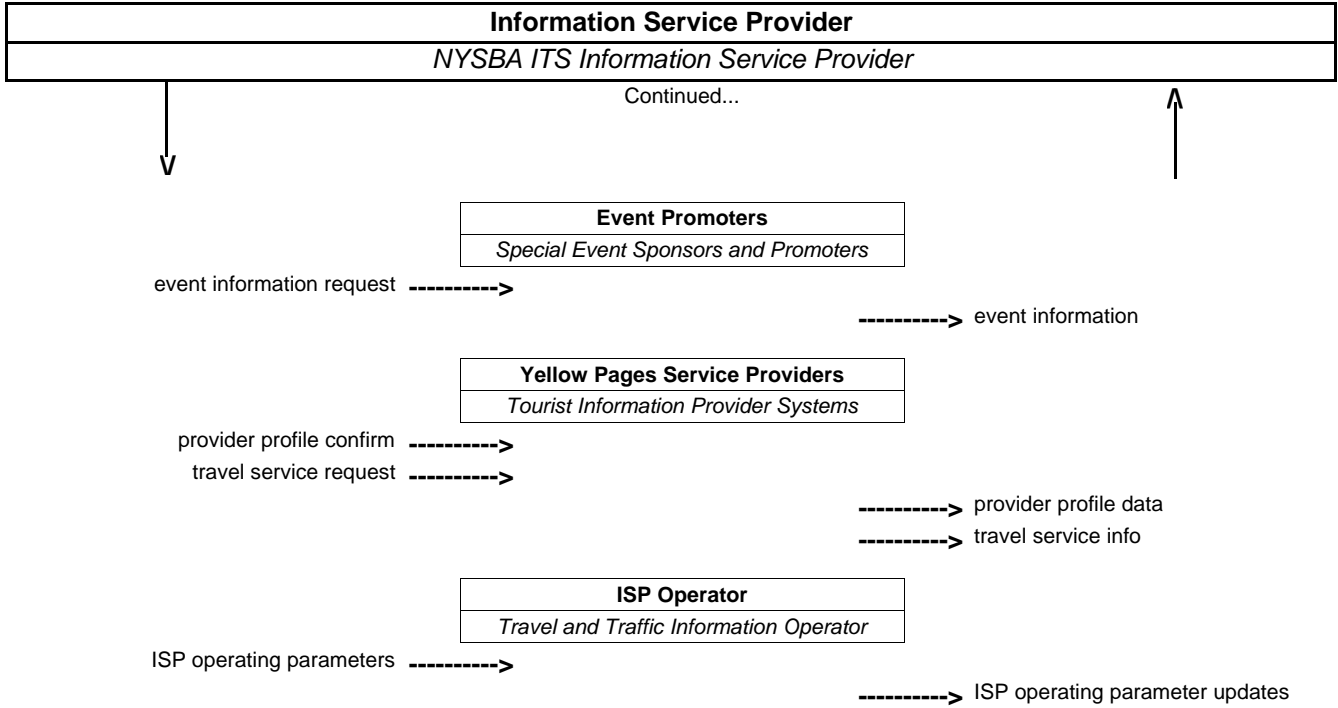
toll data request ----->

-----> toll data

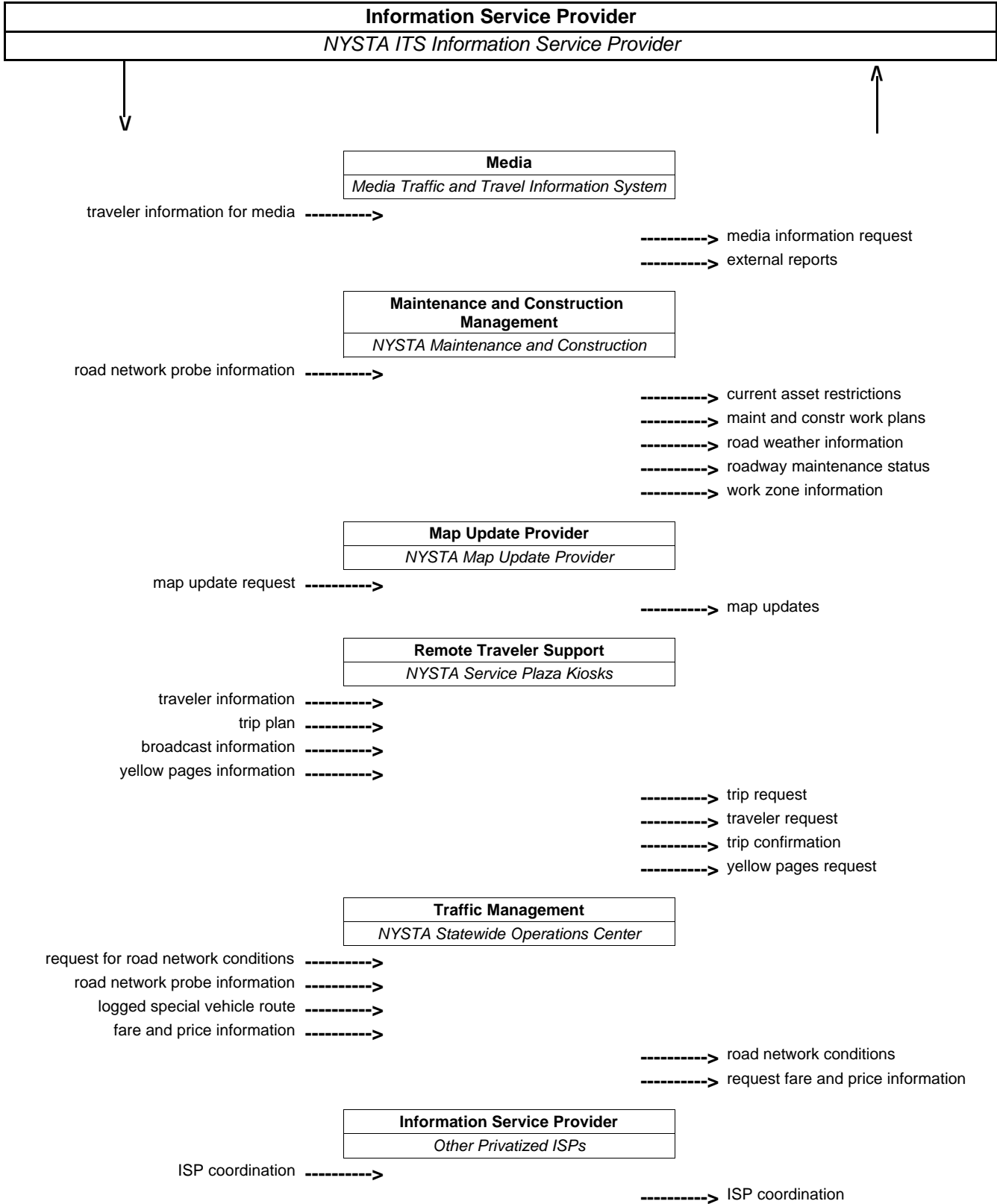
|                                     |
|-------------------------------------|
| <b>Information Service Provider</b> |
| <i>Other Privatized ISPs</i>        |

ISP coordination ----->

-----> ISP coordination

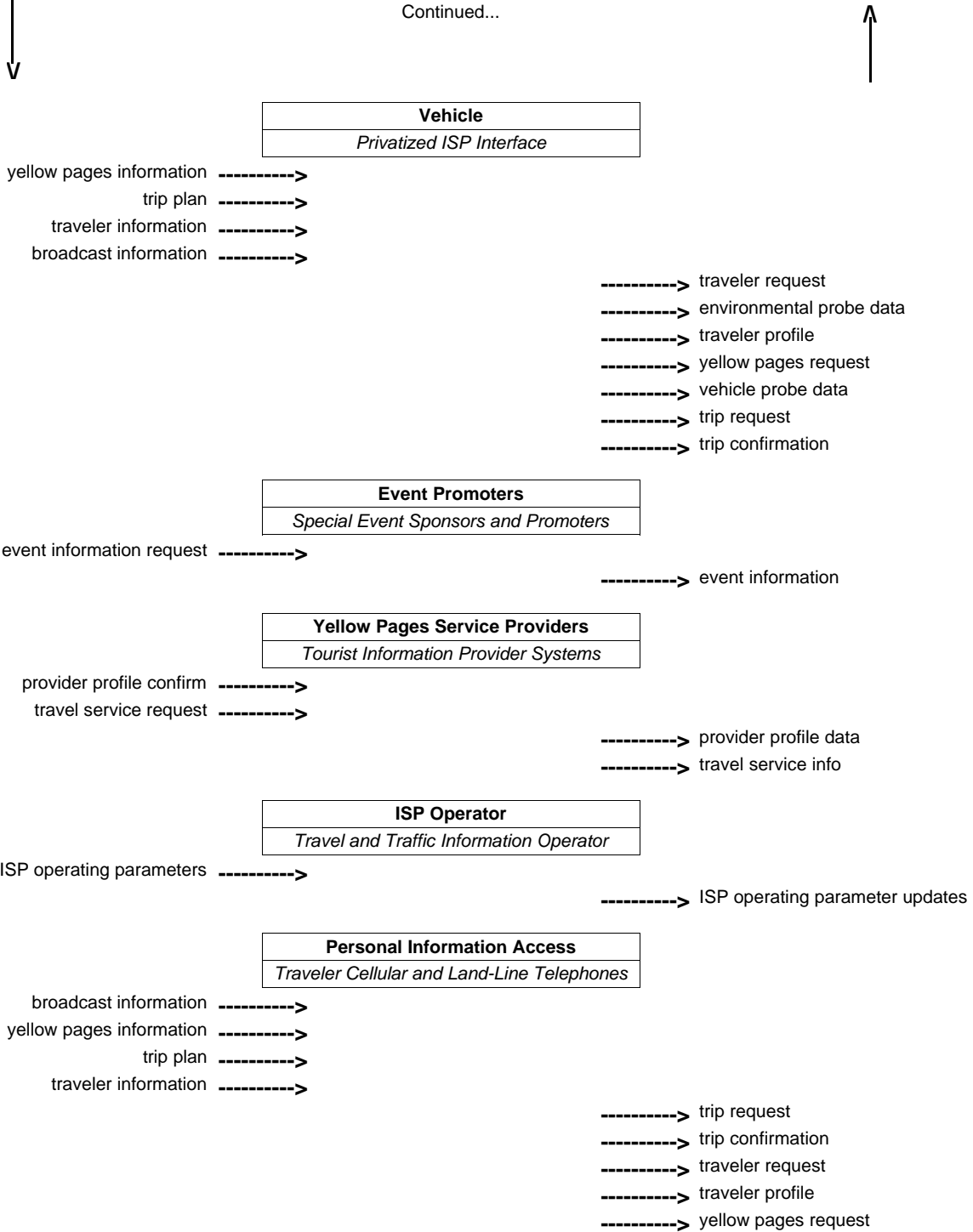






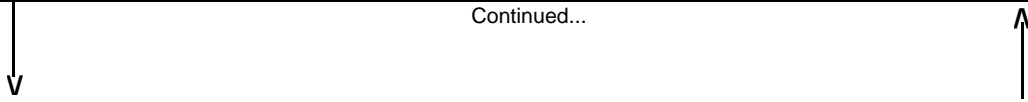
|   |
|---|
| <b>Information Service Provider</b>           |
| <i>NYSTA ITS Information Service Provider</i> |

Continued...



|   |
|---|
| <b>Information Service Provider</b>           |
| <i>NYSTA ITS Information Service Provider</i> |

Continued...



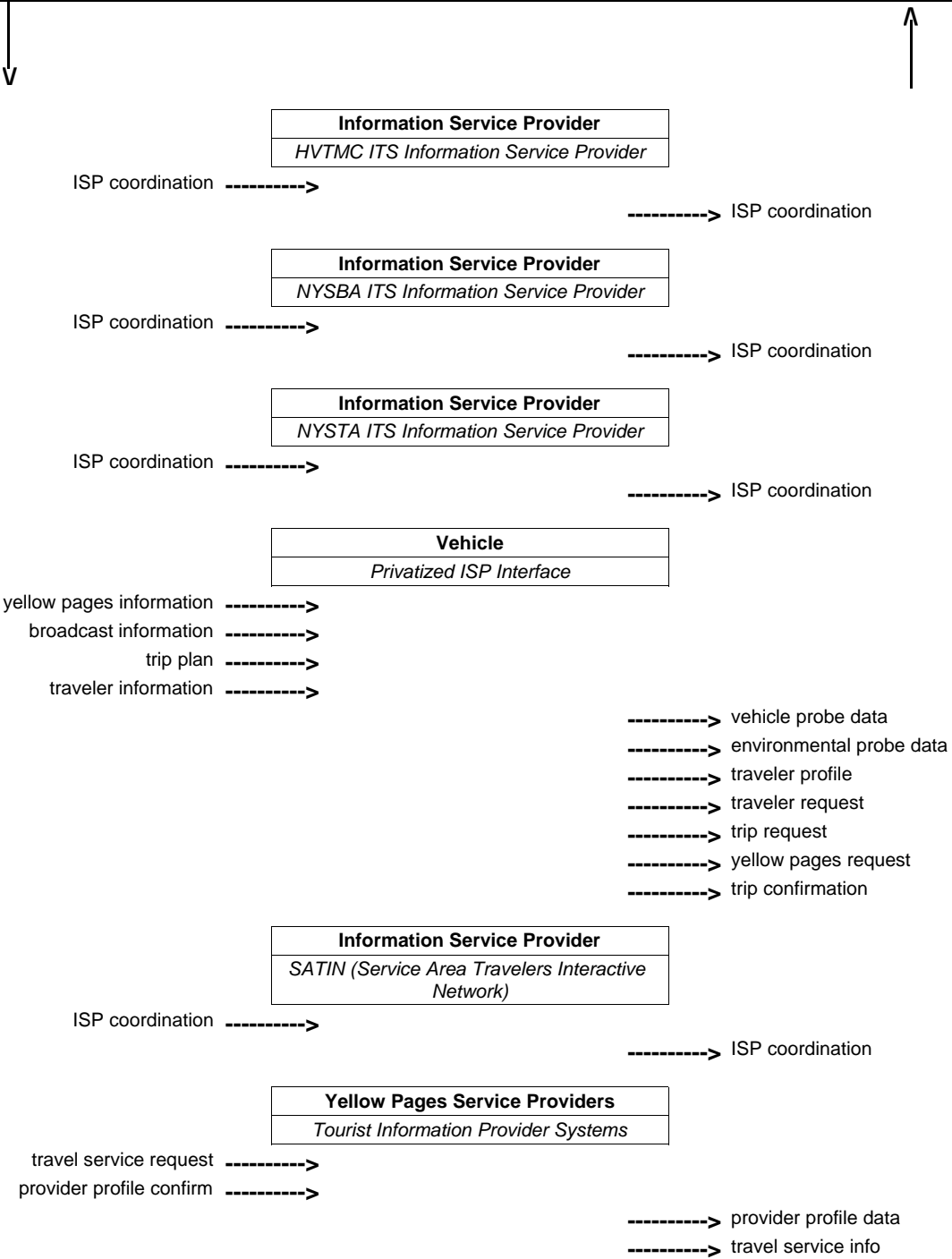
|                                    |
|------------------------------------|
| <b>Personal Information Access</b> |
| <i>Traveler PC/Info. Appliance</i> |

- broadcast information ----->
- traveler information ----->
- trip plan ----->
- yellow pages information ----->

- > traveler profile
- > traveler request
- > trip confirmation
- > trip request
- > yellow pages request

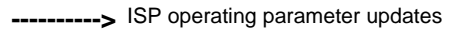
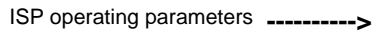
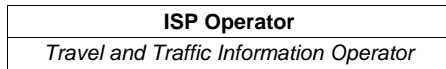
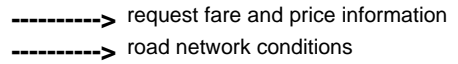
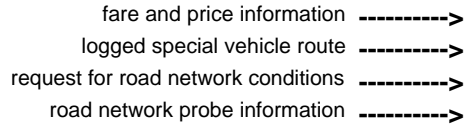
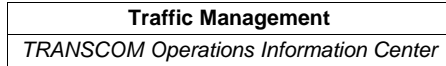
|                                     |
|-------------------------------------|
| <b>Weather Service</b>              |
| <i>Weather Network Subscription</i> |

- > weather information





Continued...



|   |
|---|
| <b>Information Service Provider</b>                       |
| <i>SATIN (Service Area Travelers Interactive Network)</i> |



|  |
|--|
| <b>Transit Management</b>                      |
| <i>Bee-Line Bus Operations Dispatch System</i> |



|  |
|--|
| <b>Transit Management</b>              |
| <i>City / Local Transit Operations</i> |



|  |
|--|
| <b>Traffic Management</b>              |
| <i>HVTMC Freeway Management System</i> |



|                                |
|--------------------------------|
| <b>Traffic Management</b>      |
| <i>NYSBA Operations Center</i> |



|  |
|--|
| <b>Traffic Management</b>                |
| <i>NYSTA Statewide Operations Center</i> |



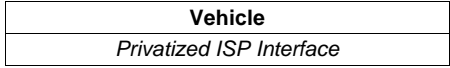


Continued...



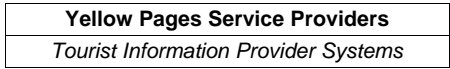
ISP coordination ----->

-----> ISP coordination



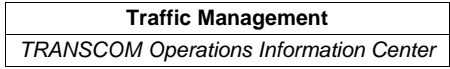
broadcast information ----->  
 yellow pages information ----->  
 traveler information ----->  
 trip plan ----->

-----> trip request  
 -----> vehicle probe data  
 -----> yellow pages request  
 -----> traveler request  
 -----> traveler profile  
 -----> environmental probe data  
 -----> trip confirmation



provider profile confirm ----->  
 travel service request ----->

-----> provider profile data  
 -----> travel service info



road network probe information ----->  
 fare and price information ----->  
 logged special vehicle route ----->  
 request for road network conditions ----->

-----> request fare and price information  
 -----> road network conditions

|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>Local Maintenance and Construction</i>      |



|  |
|--|
| <b>Traffic Management</b>              |
| <i>HVTMC Freeway Management System</i> |

- maint and constr work plans ----->
- work zone information ----->
- road weather information ----->
- maint and constr resource response ----->
- incident information ----->
- equipment maintenance status ----->
- current asset restrictions ----->
- roadway maintenance status ----->

- > work plan feedback
- > road network conditions
- > maint and constr resource request
- > field equipment status
- > incident information

|  |
|--|
| <b>Asset Management</b>                              |
| <i>Local Asset Management System for Maintenance</i> |

- asset status update ----->

- > asset inventory
- > asset restrictions
- > maintenance and repair needs

|                                      |
|--------------------------------------|
| <b>Storage Facility</b>              |
| <i>Local Maint. Storage Facility</i> |

- storage facility request ----->

- > equipment availability
- > maintenance materials storage status

|                                   |
|-----------------------------------|
| <b>Equipment Repair Facility</b>  |
| <i>Local Maintenance Facility</i> |

- maint and constr fleet information ----->

- > maint and constr equipment repair status

|  |
|--|
| <b>Maintenance and Construction Center Personnel</b> |
| <i>Local Maintenance Personnel</i>                   |

- maint and constr operations information presentation ----->

- > maint and constr center personnel inputs



|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>Local Maintenance and Construction</i>      |

Continued...



|   |
|---|
| <b>Maintenance and Construction Vehicle</b> |
| <i>Local Road Maintenance Vehicles</i>      |

environmental sensors control ----->

maint and constr vehicle system ----->

control ----->

maint and constr dispatch information ----->

-----> maint and constr vehicle location data

-----> maint and constr vehicle operational data

-----> work zone status

-----> maint and constr dispatch status

-----> infrastructure conditions data

-----> environmental probe data

-----> maint and constr vehicle conditions

-----> work zone warning status

|  |
|--|
| <b>Media</b>                                       |
| <i>Media Traffic and Travel Information System</i> |

maint and constr work plans ----->

work zone information ----->

roadway maintenance status ----->

road weather information ----->

|                                     |
|-------------------------------------|
| <b>Weather Service</b>              |
| <i>Weather Network Subscription</i> |

environmental conditions data ----->

road weather information ----->

-----> environmental conditions data

-----> weather information

|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYSBA Maintenance and Construction</i>      |



|  |
|--|
| <b>Maintenance and Construction Vehicle</b>  |
| <i>Bridge Authority Maintenance Vehicles</i> |

environmental sensors control ----->  
 maint and constr vehicle system control ----->  
 maint and constr dispatch information ----->

-----> maint and constr vehicle conditions  
 -----> maint and constr vehicle location data  
 -----> maint and constr vehicle operational data  
 -----> work zone status  
 -----> maint and constr dispatch status  
 -----> infrastructure conditions data  
 -----> environmental probe data  
 -----> work zone warning status

|  |
|--|
| <b>Media</b>                                       |
| <i>Media Traffic and Travel Information System</i> |

maint and constr work plans ----->  
 road weather information ----->  
 roadway maintenance status ----->  
 work zone information ----->

|  |
|--|
| <b>Asset Management</b>                              |
| <i>NYSBA Asset Management System for Maintenance</i> |

asset status update ----->

-----> maintenance and repair needs  
 -----> asset restrictions  
 -----> asset inventory

|   |
|---|
| <b>Information Service Provider</b>           |
| <i>NYSBA ITS Information Service Provider</i> |

current asset restrictions ----->  
 maint and constr work plans ----->  
 road weather information ----->  
 roadway maintenance status ----->  
 work zone information ----->

-----> road network probe information

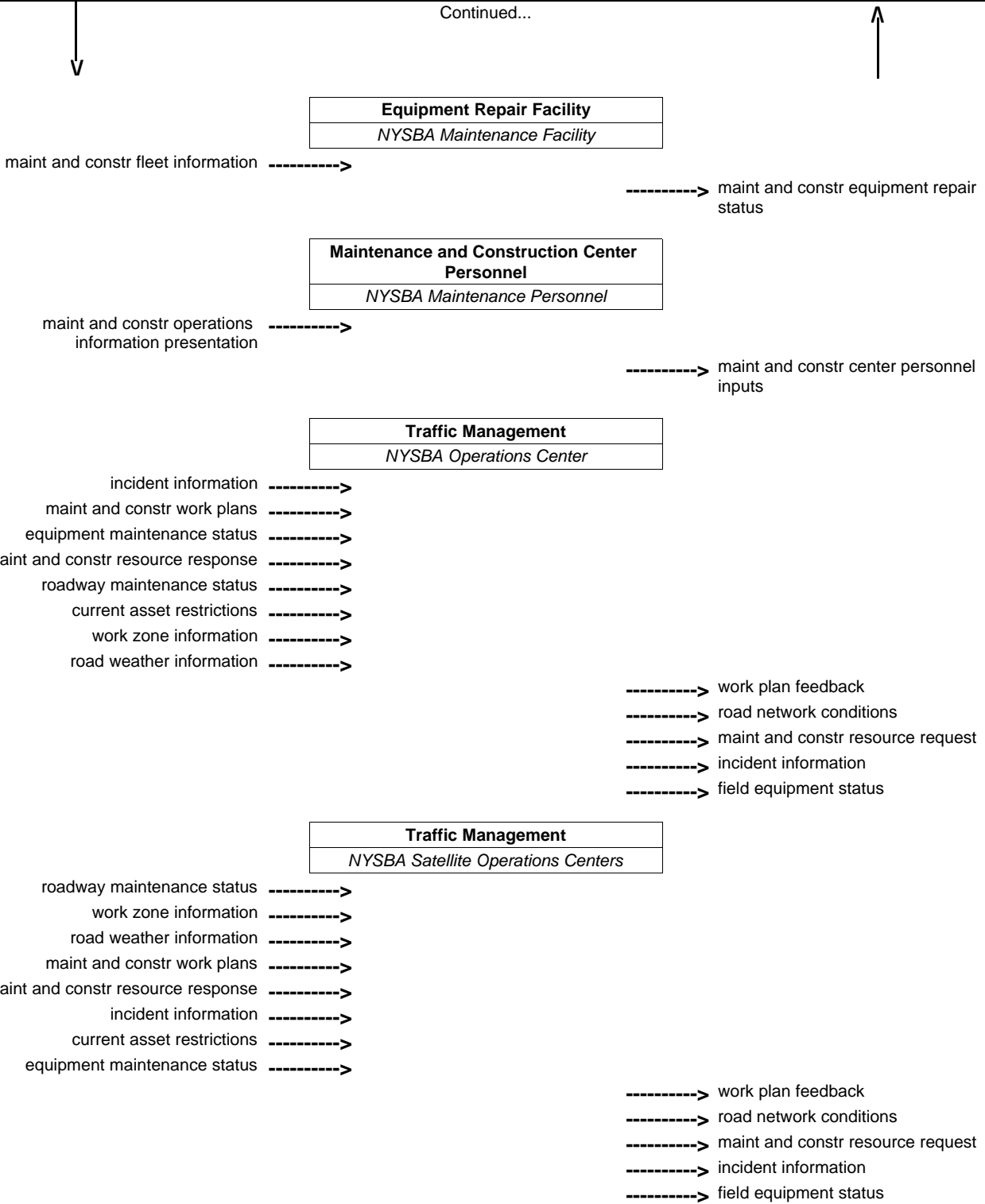
|                                      |
|--------------------------------------|
| <b>Storage Facility</b>              |
| <i>NYSBA Maint. Storage Facility</i> |

storage facility request ----->

-----> equipment availability  
 -----> maintenance materials storage status

|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYSBA Maintenance and Construction</i>      |

Continued...



|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYSBA Maintenance and Construction</i>      |

Continued...



|   |
|---|
| <b>Roadway Subsystem</b>                |
| <i>NYSBA Sensors and CCTV Equipment</i> |

- environmental sensors control ----->
- work zone warning device control ----->
- video surveillance control ----->
- speed monitoring control ----->
- infrastructure monitoring sensor control ----->

- > environmental conditions data
- > traffic images
- > speed monitoring information
- > roadway information system status
- > infrastructure monitoring sensor data
- > field device status
- > work zone warning status

|   |
|---|
| <b>Archived Data Management Subsystem</b> |
| <i>NYSBA Toll Archive System</i>          |

maint and constr archive data ----->

- > archive requests
- > archive status

|                           |
|---------------------------|
| <b>Enforcement Agency</b> |
| <i>NYSP</i>               |

request for enforcement ----->

|                                     |
|-------------------------------------|
| <b>Weather Service</b>              |
| <i>Weather Network Subscription</i> |

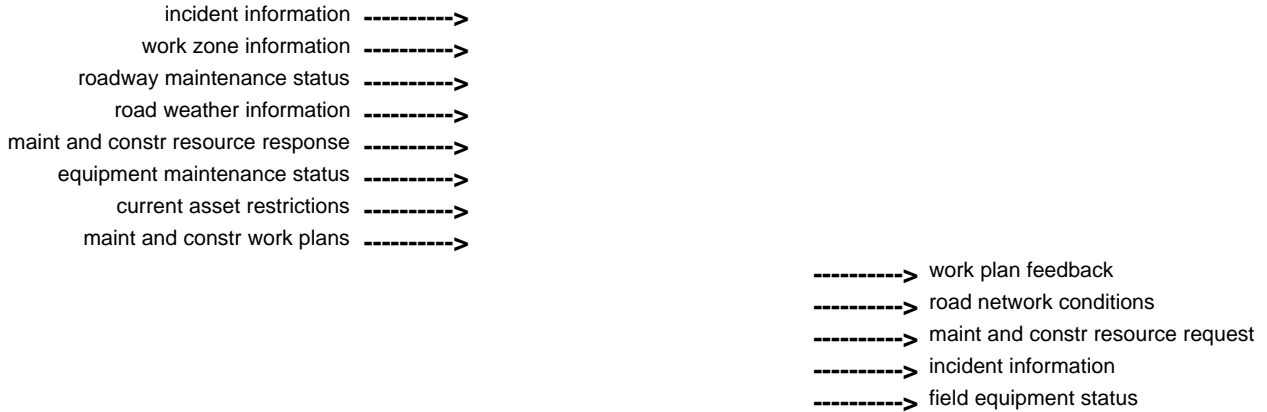
- road weather information ----->
- environmental conditions data ----->

- > environmental conditions data
- > weather information

|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYS DOT Maintenance and Construction</i>    |



|  |
|--|
| <b>Traffic Management</b>              |
| <i>HVTMC Freeway Management System</i> |



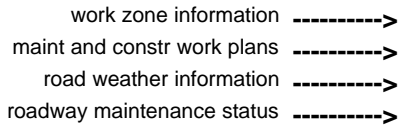
|   |
|---|
| <b>Information Service Provider</b>           |
| <i>HVTMC ITS Information Service Provider</i> |



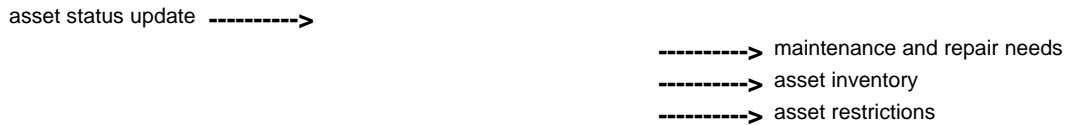
|   |
|---|
| <b>Archived Data Management Subsystem</b> |
| <i>HVTMC Traffic Data Archive</i>         |



|  |
|--|
| <b>Media</b>                                       |
| <i>Media Traffic and Travel Information System</i> |

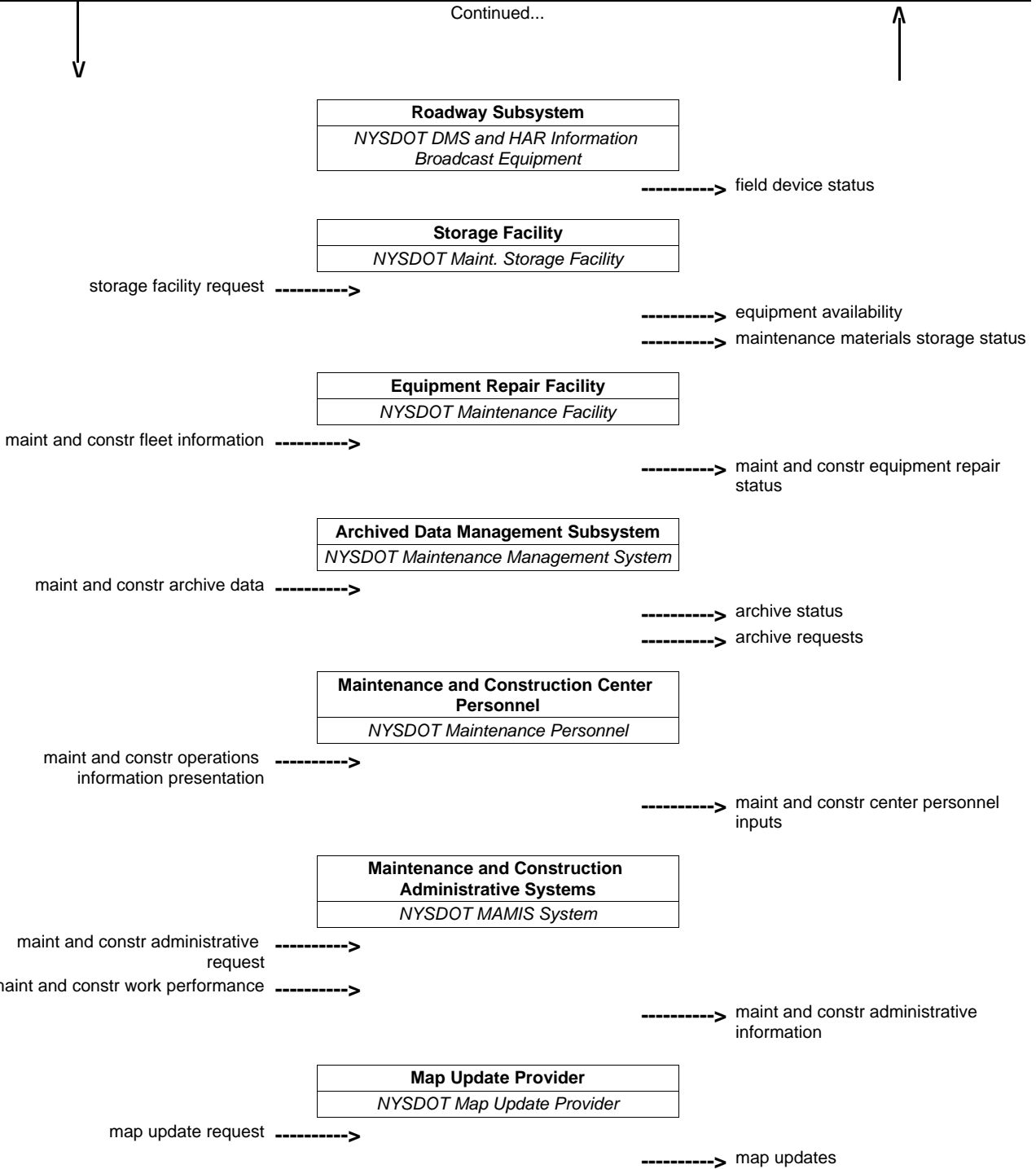


|  |
|--|
| <b>Asset Management</b>                                |
| <i>NYS DOT Asset Management System for Maintenance</i> |



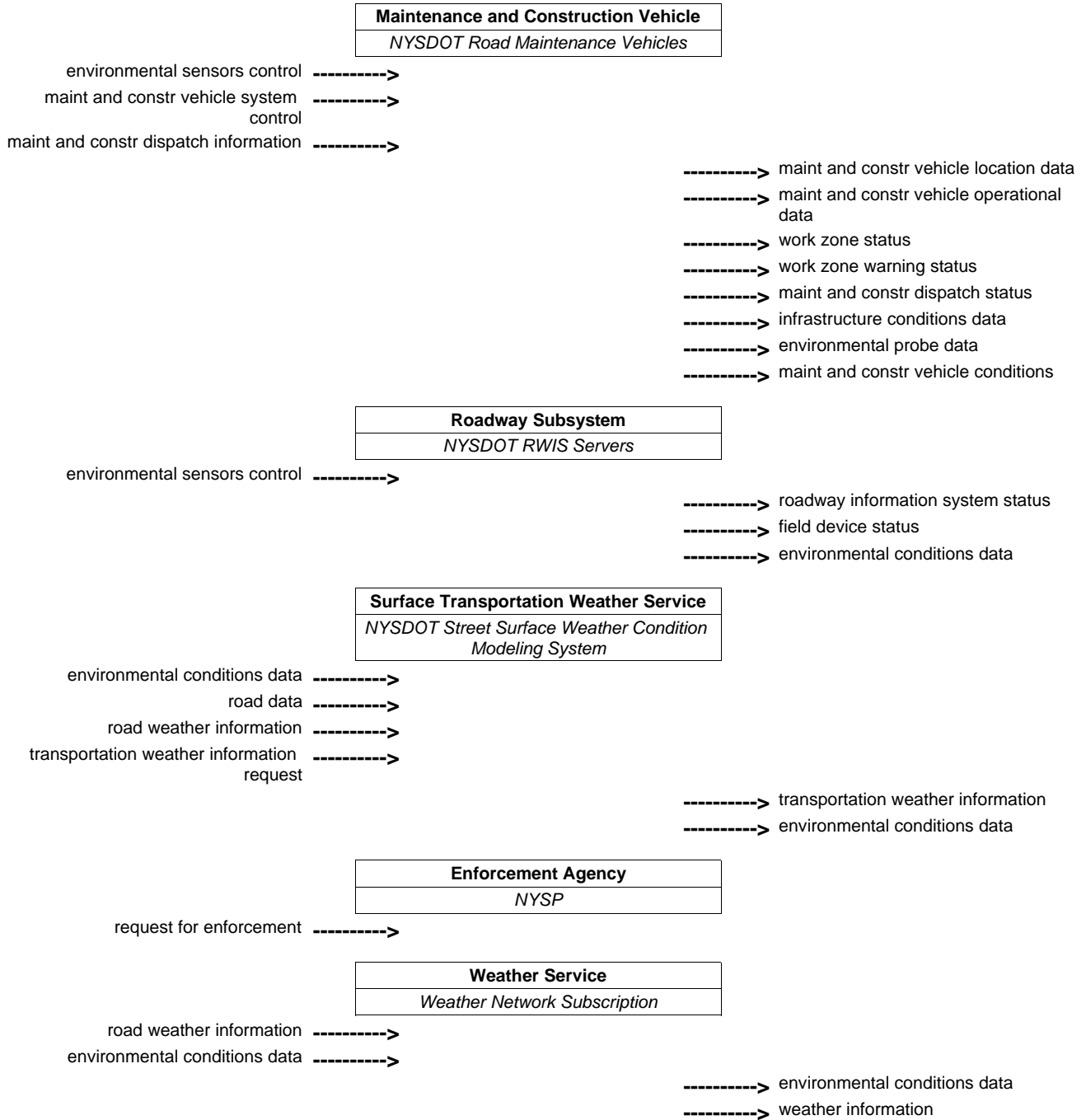
|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYSDOT Maintenance and Construction</i>     |

Continued...



|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYSDOT Maintenance and Construction</i>     |

Continued...



**Maintenance and Construction Management**  
*NYSTA Maintenance and Construction*



**Media**  
*Media Traffic and Travel Information System*

- road weather information ----->
- roadway maintenance status ----->
- work zone information ----->
- maint and constr work plans ----->

**Enforcement Agency**  
*NYSP*

- request for enforcement ----->

**Asset Management**  
*NYSTA Asset Management System for Maintenance*

- asset status update ----->

- > maintenance and repair needs
- > asset restrictions
- > asset inventory

**Roadway Subsystem**  
*NYSTA DMS and HAR Information Broadcast Equipment*

- roadway information system data ----->

- > roadway information system status
- > field device status

**Roadway Subsystem**  
*NYSTA DSRC Equipment*

- environmental sensors control ----->
- work zone warning device control ----->
- speed monitoring control ----->
- roadway information system data ----->
- infrastructure monitoring sensor control ----->

- > work zone warning status
- > speed monitoring information
- > roadway information system status
- > infrastructure monitoring sensor data
- > environmental conditions data
- > field device status

**Archived Data Management Subsystem**  
*NYSTA Infrastructure Inventory and Inspection System*

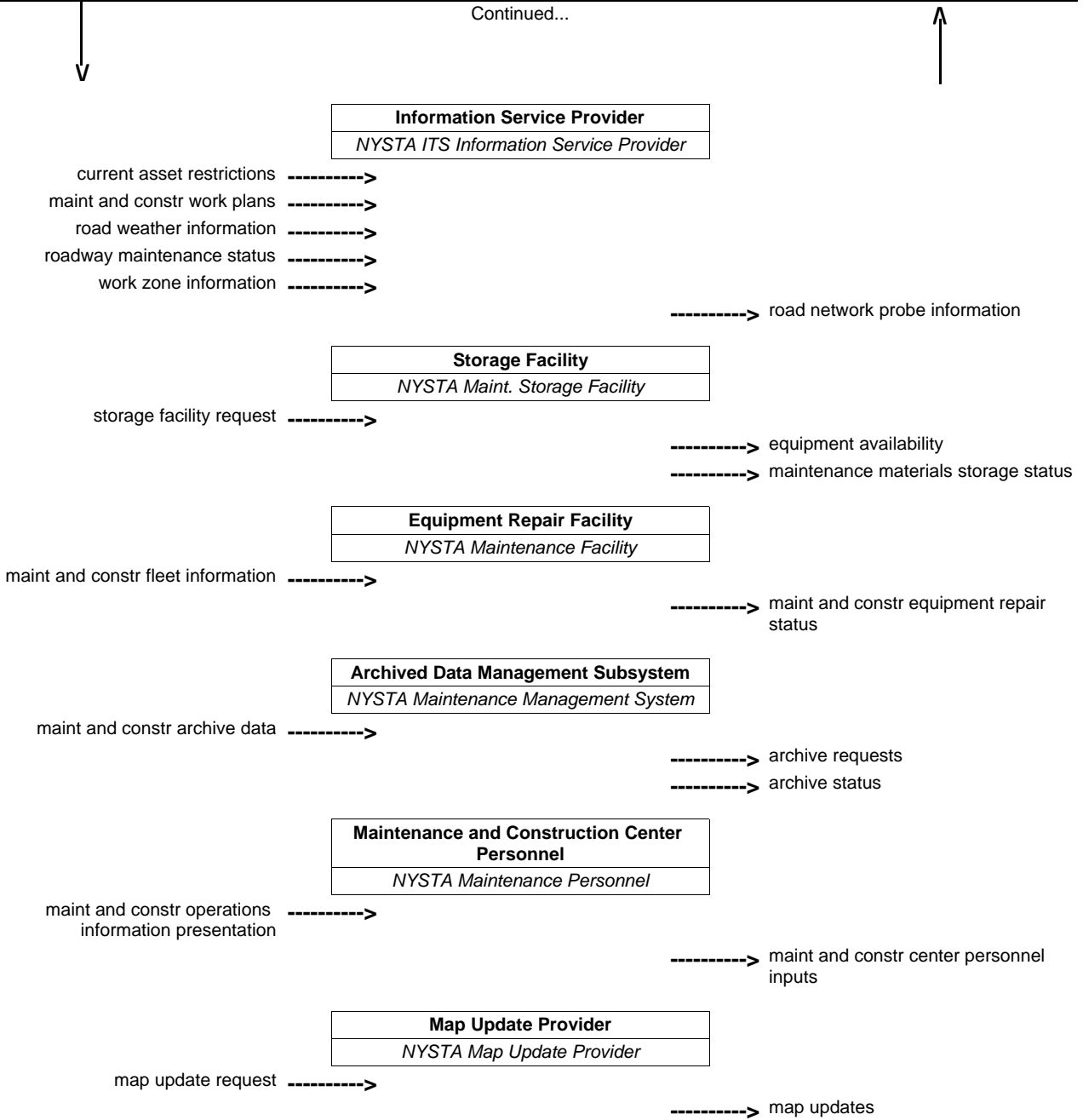
- maint and constr archive data ----->

- > archive requests
- > archive status



|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYSTA Maintenance and Construction</i>      |

Continued...



|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYSTA Maintenance and Construction</i>      |

Continued...



|   |
|---|
| <b>Maintenance and Construction Vehicle</b> |
| <i>NYSTA Road Maintenance Vehicles</i>      |

maint and constr dispatch information ----->  
 environmental sensors control ----->  
 maint and constr vehicle system control ----->

-----> maint and constr vehicle operational data  
 -----> infrastructure conditions data  
 -----> maint and constr dispatch status  
 -----> maint and constr vehicle location data  
 -----> work zone status  
 -----> work zone warning status  
 -----> maint and constr vehicle conditions

|   |
|---|
| <b>Roadway Subsystem</b>                |
| <i>NYSTA Sensors and CCTV Equipment</i> |

video surveillance control ----->  
 infrastructure monitoring sensor control ----->  
 speed monitoring control ----->  
 work zone warning device control ----->  
 environmental sensors control ----->

-----> work zone warning status  
 -----> speed monitoring information  
 -----> infrastructure monitoring sensor data  
 -----> field device status  
 -----> environmental conditions data  
 -----> traffic images

|  |
|--|
| <b>Traffic Management</b>                |
| <i>NYSTA Statewide Operations Center</i> |

incident information ----->  
 roadway maintenance status ----->  
 work zone information ----->  
 road weather information ----->  
 maint and constr work plans ----->  
 maint and constr resource response ----->  
 current asset restrictions ----->  
 equipment maintenance status ----->

-----> work plan feedback  
 -----> road network conditions  
 -----> maint and constr resource request  
 -----> incident information  
 -----> field equipment status

|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYSTA Maintenance and Construction</i>      |

Continued...



|   |
|---|
| <b>Surface Transportation Weather Service</b>                 |
| <i>NYSTA Street Surface Weather Condition Modeling System</i> |

- environmental conditions data ----->
- transportation weather information ----->
- request ----->
- road data ----->
- road weather information ----->

- > environmental conditions data
- > transportation weather information

|                                      |
|--------------------------------------|
| <b>Traffic Management</b>            |
| <i>NYSTA Tarrytown Equipment Hub</i> |

- current asset restrictions ----->
- roadway maintenance status ----->
- road weather information ----->
- maint and constr work plans ----->
- maint and constr resource response ----->
- work zone information ----->
- incident information ----->
- equipment maintenance status ----->

- > road network conditions
- > maint and constr resource request
- > incident information
- > field equipment status
- > work plan feedback

|   |
|---|
| <b>Archived Data Management Subsystem</b> |
| <i>NYSTA Toll Data Storage System</i>     |

- maint and constr archive data ----->

- > archive status
- > archive requests

|  |
|--|
| <b>Archived Data Management Subsystem</b>              |
| <i>NYSTA Traffic Data Storage and Retrieval System</i> |

- maint and constr archive data ----->

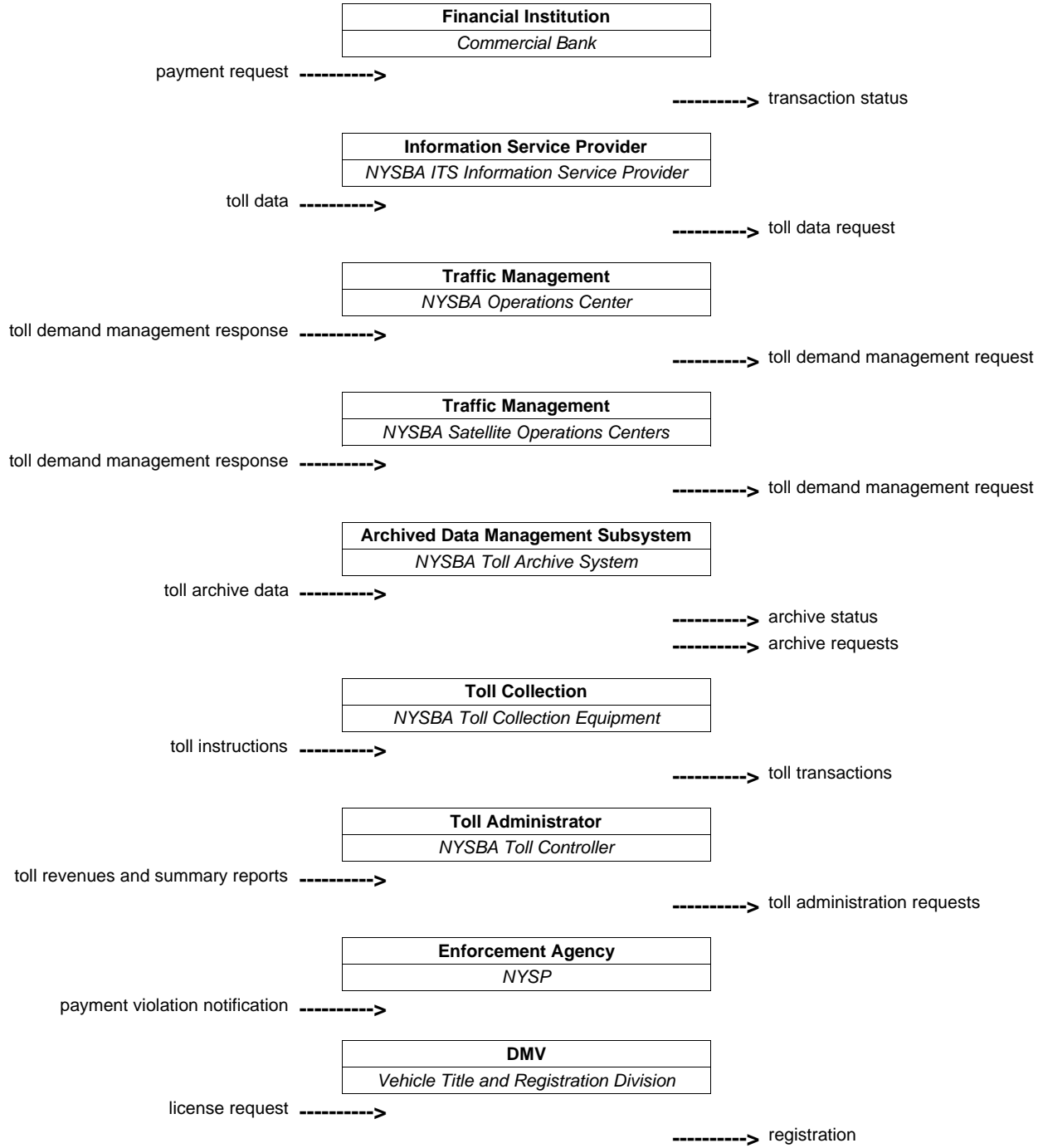
- > archive status
- > archive requests

|                                     |
|-------------------------------------|
| <b>Weather Service</b>              |
| <i>Weather Network Subscription</i> |

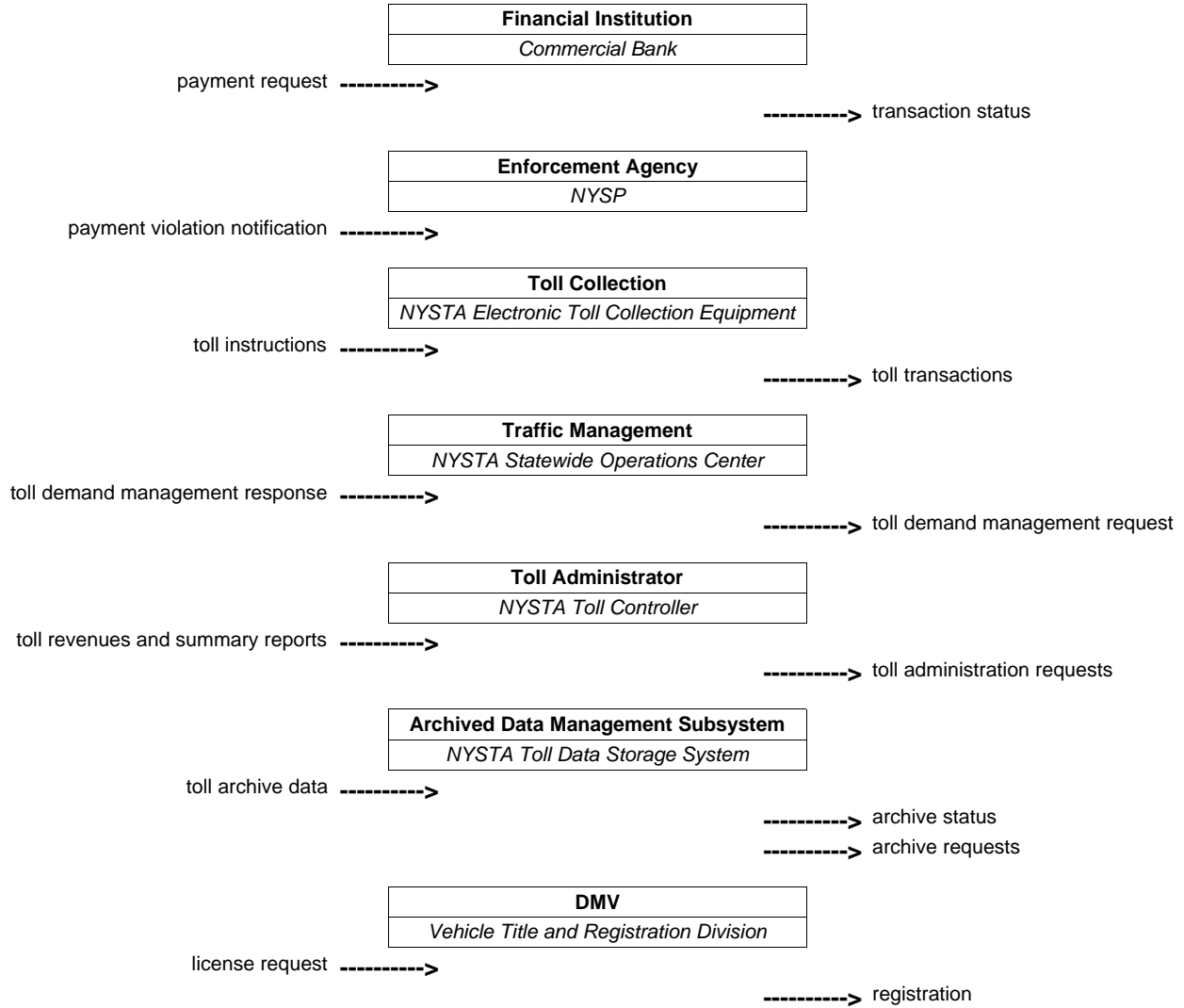
- road weather information ----->
- environmental conditions data ----->

- > environmental conditions data
- > weather information

|                              |
|------------------------------|
| <b>Toll Administration</b>   |
| <i>NYSBA Toll Operations</i> |



|                              |
|------------------------------|
| <b>Toll Administration</b>   |
| <i>NYSTA Toll Operations</i> |



|  |
|--|
| <b>Traffic Management</b>              |
| <i>HVTMC Freeway Management System</i> |



|  |
|--|
| <b>Transit Management</b>                      |
| <i>Bee-Line Bus Operations Dispatch System</i> |

traffic control priority status ----->  
 transit demand management request ----->  
 road network conditions ----->  
 request transit information ----->

-----> transit system data  
 -----> transit demand management response  
 -----> traffic control priority request  
 -----> road network probe information  
 -----> request for road network conditions

|  |
|--|
| <b>Traffic Operations Personnel</b>              |
| <i>HVTMC Freeway Management System Operators</i> |

traffic operator data ----->

-----> traffic operator inputs

|   |
|---|
| <b>Archived Data Management Subsystem</b> |
| <i>HVTMC Incident Data Archive</i>        |

traffic archive data ----->

-----> archive requests  
 -----> archive status

|   |
|---|
| <b>Information Service Provider</b>           |
| <i>HVTMC ITS Information Service Provider</i> |

request fare and price information ----->  
 road network conditions ----->

-----> logged special vehicle route  
 -----> request for road network conditions  
 -----> fare and price information  
 -----> road network probe information

|   |
|---|
| <b>Archived Data Management Subsystem</b> |
| <i>HVTMC Traffic Data Archive</i>         |

traffic archive data ----->

-----> archive requests  
 -----> archive status

|   |
|---|
| <b>Information Service Provider</b>     |
| <i>IEN Information Exchange Network</i> |

road network conditions ----->

-----> request for road network conditions  
 -----> logged special vehicle route  
 -----> road network probe information

|  |
|--|
| <b>Traffic Management</b>              |
| <i>HVTMC Freeway Management System</i> |

Continued...



|                                     |
|-------------------------------------|
| <b>Information Service Provider</b> |
| <i>IRVN Video Network</i>           |

road network conditions ----->

-----> request for road network conditions

|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>Local Maintenance and Construction</i>      |

field equipment status ----->  
 maint and constr resource request ----->  
 road network conditions ----->  
 incident information ----->  
 work plan feedback ----->

-----> road weather information  
 -----> roadway maintenance status  
 -----> work zone information  
 -----> maint and constr resource response  
 -----> incident information  
 -----> equipment maintenance status  
 -----> current asset restrictions  
 -----> maint and constr work plans

|  |
|--|
| <b>Media</b>                                       |
| <i>Media Traffic and Travel Information System</i> |

road network conditions ----->

-----> media information request  
 -----> external reports

|  |
|--|
| <b>Transit Management</b>                        |
| <i>Metro North Rail Operation Control Center</i> |

request transit information ----->  
 road network conditions ----->  
 traffic control priority status ----->  
 transit demand management request ----->

-----> transit system data  
 -----> traffic control priority request

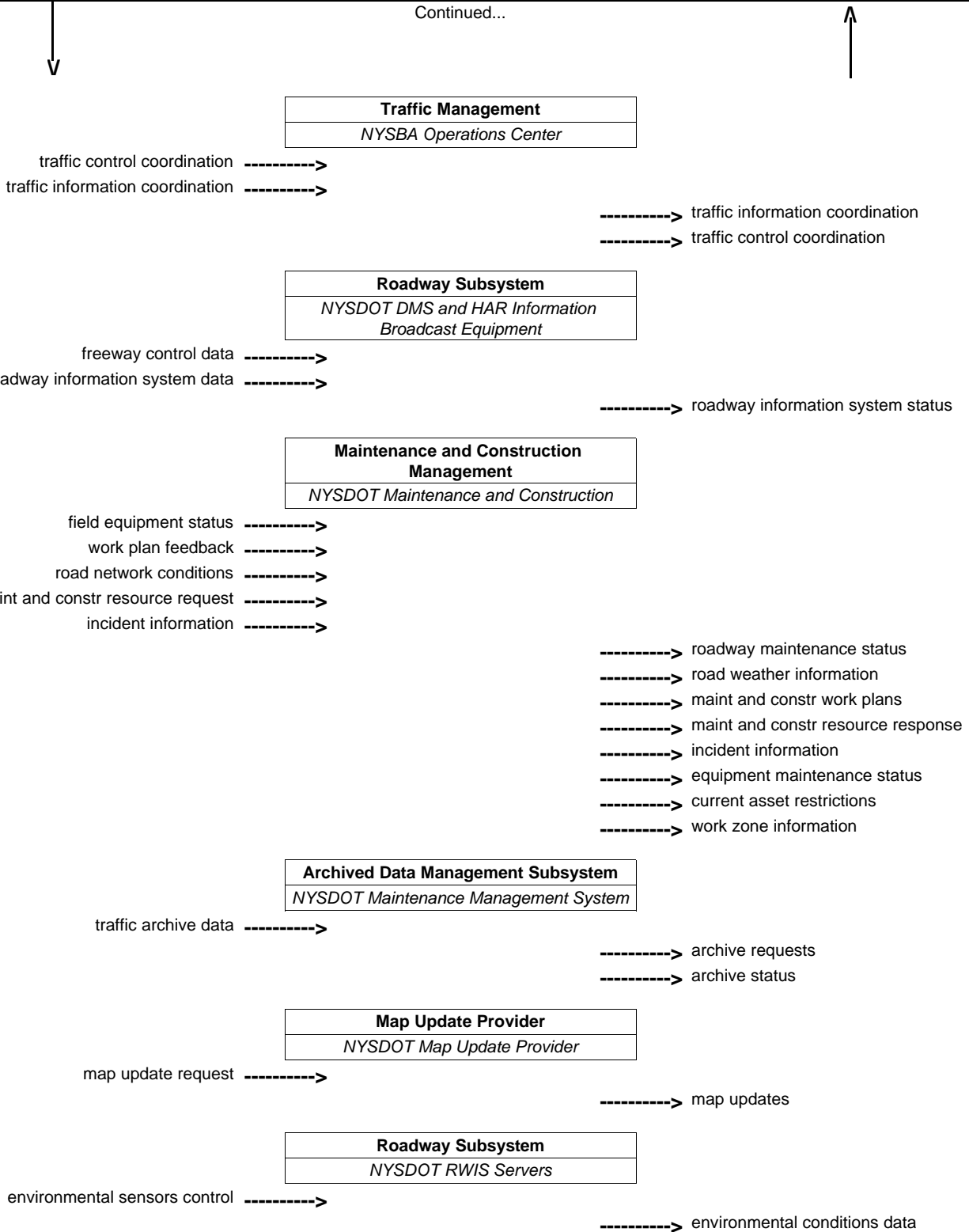
|                                    |
|------------------------------------|
| <b>Rail Operations</b>             |
| <i>Metro North Rail Operations</i> |

hri advisories ----->

-----> railroad advisories  
 -----> railroad schedules

|  |
|--|
| <b>Traffic Management</b>              |
| <i>HVTMC Freeway Management System</i> |

Continued...





|  |
|--|
| <b>Traffic Management</b>              |
| <i>HVTMC Freeway Management System</i> |

Continued...



|  |
|--|
| <b>Roadway Subsystem</b>                 |
| <i>NYSDOT Sensors and CCTV Equipment</i> |

- speed monitoring control ----->
- traffic sensor control ----->
- signal control data ----->
- hri request ----->
- hri control data ----->
- freeway control data ----->
- environmental sensors control ----->
- AHS control information ----->
- video surveillance control ----->

- > intersection blockage notification
- > emissions data
- > environmental conditions data
- > environmental probe data
- > signal control status
- > hri status
- > request for right-of-way
- > reversible lane status
- > vehicle probe data
- > traffic images
- > traffic flow
- > speed monitoring information
- > freeway control status

|  |
|--|
| <b>Surface Transportation Weather Service</b>                  |
| <i>NYSDOT Street Surface Weather Condition Modeling System</i> |

- environmental conditions data ----->
- transportation weather information ----->
- request ----->

- > environmental conditions data
- > transportation weather information

|                           |
|---------------------------|
| <b>Enforcement Agency</b> |
| <i>NYSP</i>               |

- request for enforcement ----->
- traffic violation notification ----->

|  |
|--|
| <b>Traffic Management</b>              |
| <i>HVTMC Freeway Management System</i> |

Continued...



|  |
|--|
| <b>Emergency Management</b>                |
| <i>NYSP Central Communication/Dispatch</i> |

- road network conditions ----->
- resource deployment status ----->
- incident information request ----->
- incident information ----->
- emergency traffic control response ----->

- > remote surveillance control
- > resource request
- > incident response status
- > incident information
- > emergency traffic control request
- > road network probe information

|  |
|--|
| <b>Traffic Management</b>                |
| <i>NYSTA Statewide Operations Center</i> |

- traffic information coordination ----->
- traffic control coordination ----->

- > traffic information coordination
- > traffic control coordination

|   |
|---|
| <b>Other TM</b>   |
| <i>Other DOTs TMCs in CT &amp; NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops)</i> |

- traffic control coordination ----->
- traffic information coordination ----->

- > traffic control coordination
- > traffic information coordination

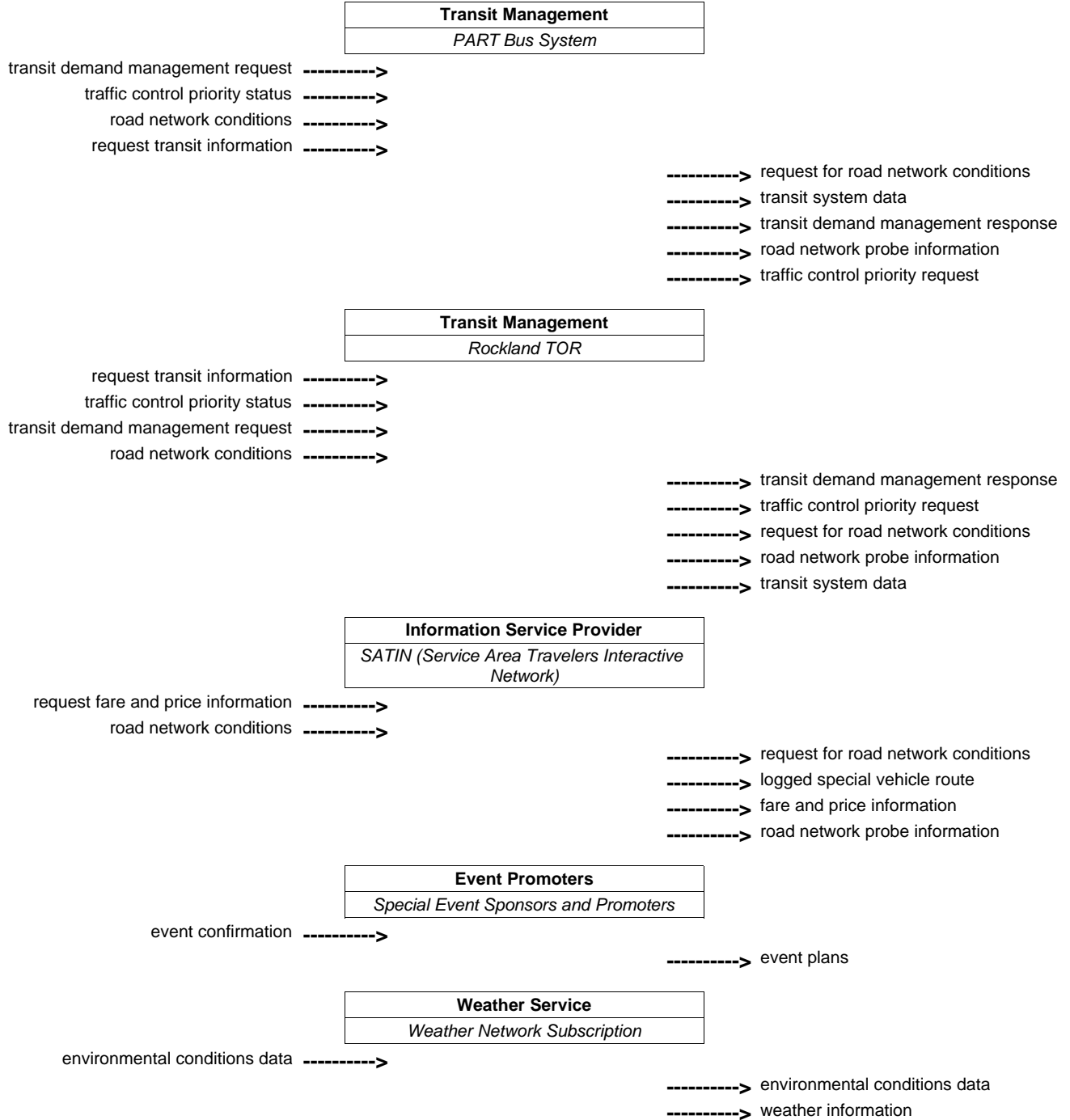
|   |
|---|
| <b>Other TM</b>   |
| <i>Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)</i> |

- traffic control coordination ----->
- traffic information coordination ----->

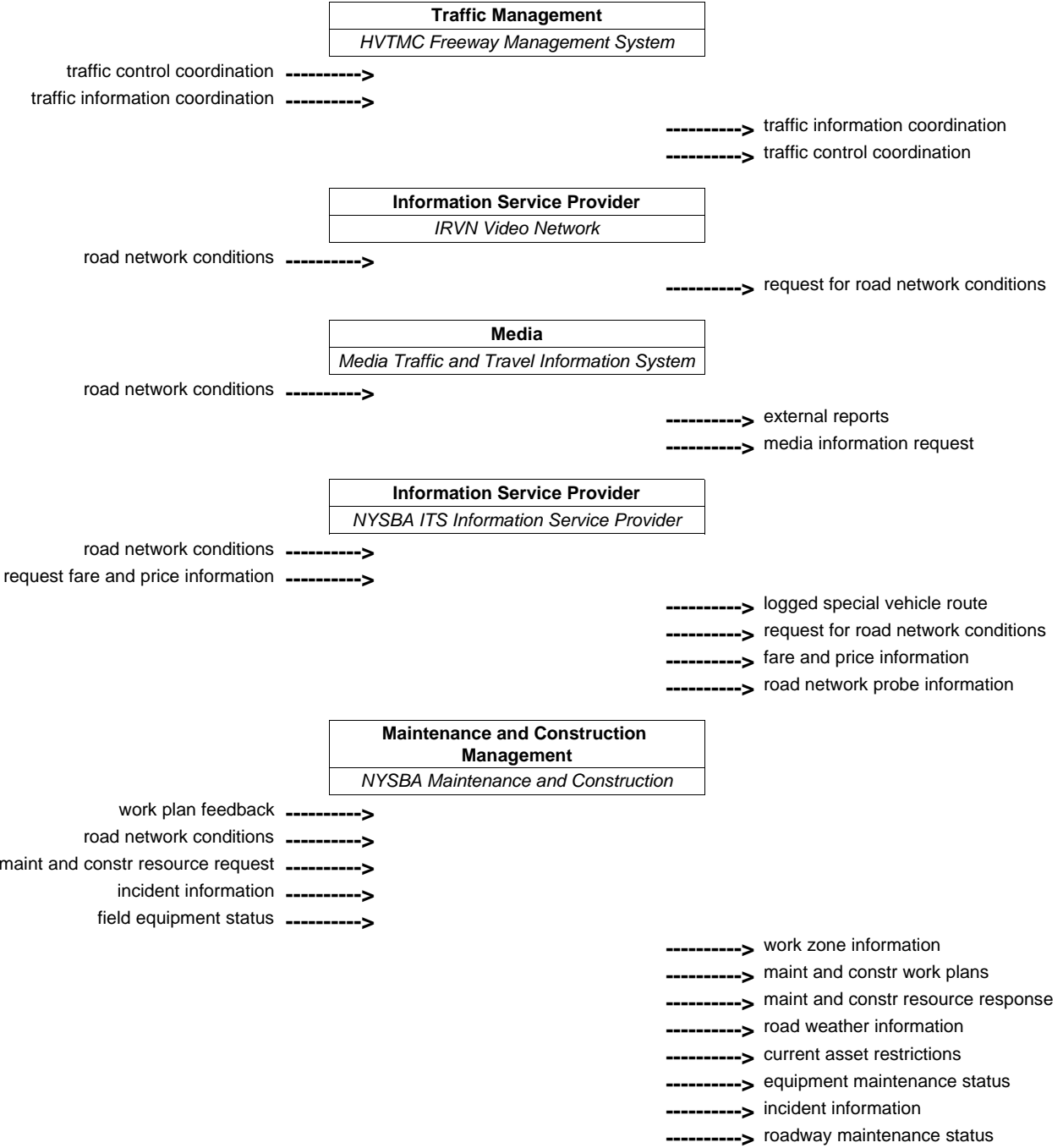
- > traffic control coordination
- > traffic information coordination

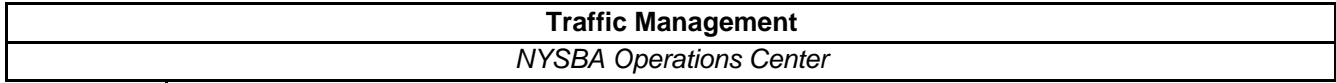
**Traffic Management**  
*HVTMC Freeway Management System*

Continued...

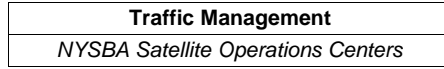


|                                |
|--------------------------------|
| <b>Traffic Management</b>      |
| <i>NYSBA Operations Center</i> |



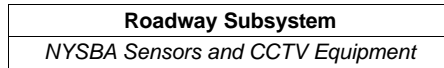


Continued...



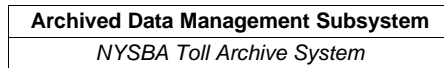
traffic control coordination ----->  
 traffic information coordination ----->

-----> traffic information coordination  
 -----> traffic control coordination



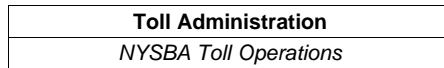
environmental sensors control ----->  
 freeway control data ----->  
 roadway information system data ----->  
 signal control data ----->  
 speed monitoring control ----->  
 traffic sensor control ----->  
 video surveillance control ----->

-----> roadway information system status  
 -----> traffic flow  
 -----> environmental conditions data  
 -----> traffic images  
 -----> speed monitoring information  
 -----> signal control status  
 -----> request for right-of-way  
 -----> reversible lane status  
 -----> intersection blockage notification  
 -----> freeway control status



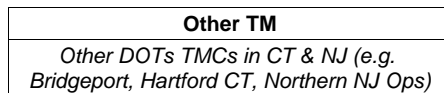
traffic archive data ----->

-----> archive status  
 -----> archive requests



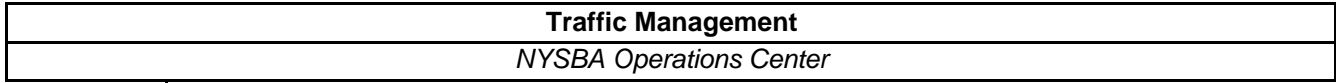
toll demand management request ----->

-----> toll demand management response

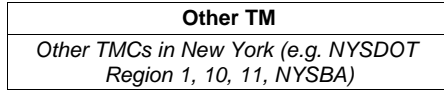


traffic control coordination ----->  
 traffic information coordination ----->

-----> traffic control coordination  
 -----> traffic information coordination

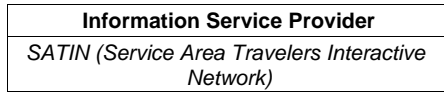


Continued...



traffic control coordination ----->  
 traffic information coordination ----->

-----> traffic control coordination  
 -----> traffic information coordination



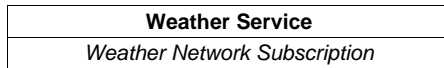
road network conditions ----->  
 request fare and price information ----->

-----> logged special vehicle route  
 -----> request for road network conditions  
 -----> fare and price information  
 -----> road network probe information



event confirmation ----->

-----> event plans



environmental conditions data ----->

-----> environmental conditions data  
 -----> weather information

|   |
|---|
| <b>Traffic Management</b>                 |
| <i>NYSBA Satellite Operations Centers</i> |



|   |
|---|
| <b>Information Service Provider</b>           |
| <i>NYSBA ITS Information Service Provider</i> |

request fare and price information ----->  
road network conditions ----->

-----> logged special vehicle route  
-----> request for road network conditions  
-----> road network probe information  
-----> fare and price information

|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYSBA Maintenance and Construction</i>      |

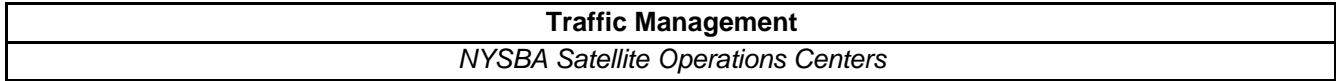
work plan feedback ----->  
road network conditions ----->  
maint and constr resource request ----->  
incident information ----->  
field equipment status ----->

-----> maint and constr resource response  
-----> work zone information  
-----> roadway maintenance status  
-----> maint and constr work plans  
-----> incident information  
-----> equipment maintenance status  
-----> current asset restrictions  
-----> road weather information

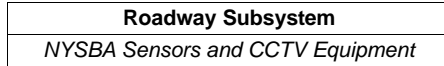
|                                |
|--------------------------------|
| <b>Traffic Management</b>      |
| <i>NYSBA Operations Center</i> |

traffic control coordination ----->  
traffic information coordination ----->

-----> traffic control coordination  
-----> traffic information coordination

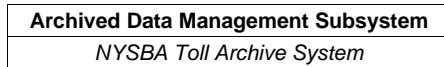


Continued...



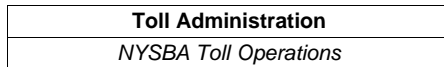
- environmental sensors control ----->
- video surveillance control ----->
- traffic sensor control ----->
- speed monitoring control ----->
- signal control data ----->
- freeway control data ----->

- > traffic flow
- > speed monitoring information
- > signal control status
- > reversible lane status
- > request for right-of-way
- > intersection blockage notification
- > freeway control status
- > environmental probe data
- > environmental conditions data
- > traffic images



traffic archive data ----->

- > archive requests
- > archive status

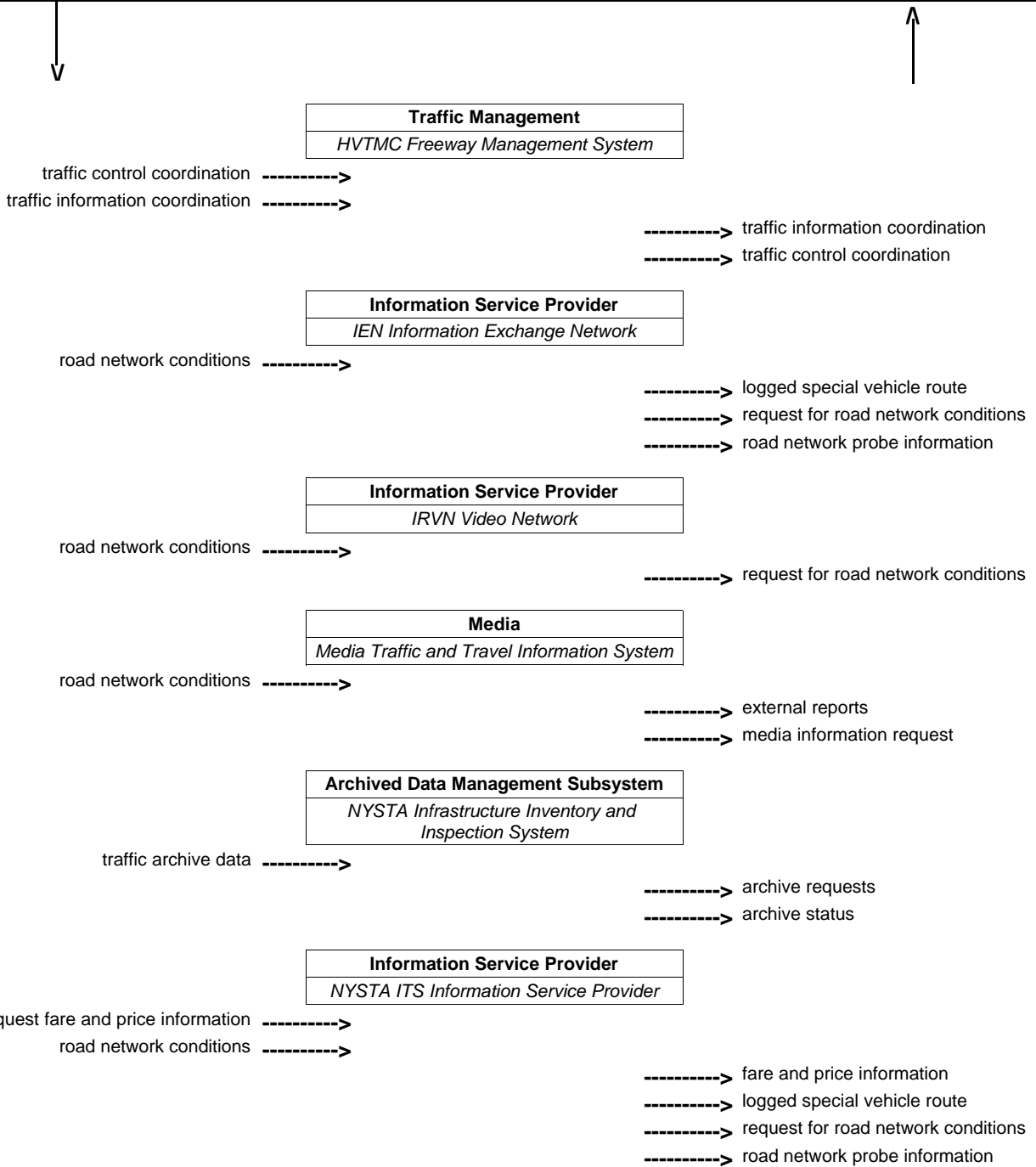


toll demand management request ----->

-----> toll demand management response



|  |
|--|
| <b>Traffic Management</b>                |
| <i>NYSTA Statewide Operations Center</i> |



|  |
|--|
| <b>Traffic Management</b>                |
| <i>NYSTA Statewide Operations Center</i> |

Continued...



|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYSTA Maintenance and Construction</i>      |

- work plan feedback ----->
- road network conditions ----->
- maint and constr resource request ----->
- incident information ----->
- field equipment status ----->

- > work zone information
- > equipment maintenance status
- > road weather information
- > maint and constr work plans
- > current asset restrictions
- > incident information
- > roadway maintenance status
- > maint and constr resource response

|  |
|--|
| <b>Archived Data Management Subsystem</b>  |
| <i>NYSTA Maintenance Management System</i> |

- > archive requests
- > archive status

|                                  |
|----------------------------------|
| <b>Map Update Provider</b>       |
| <i>NYSTA Map Update Provider</i> |

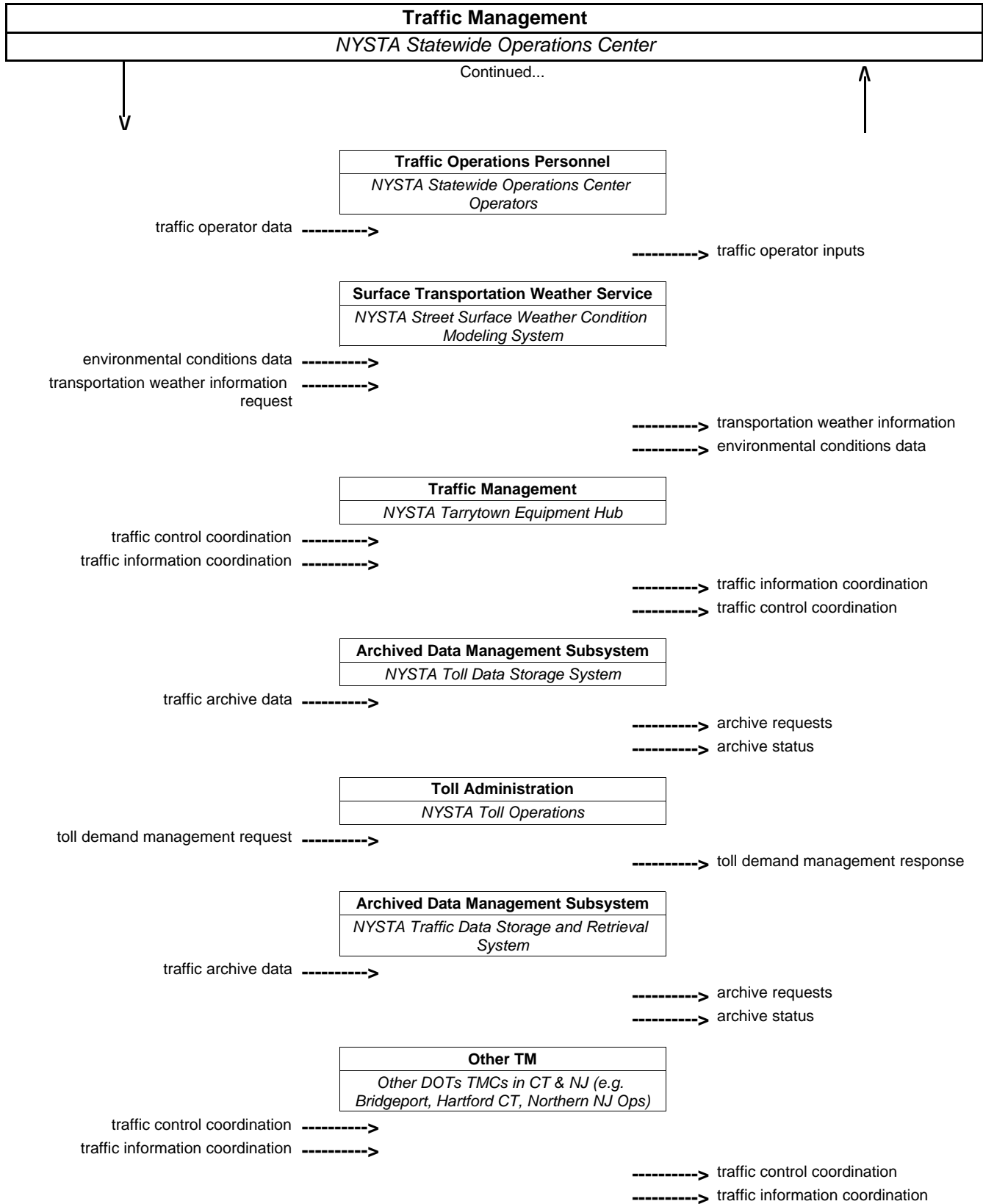
map update request ----->

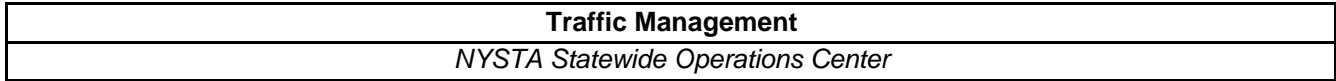
-----> map updates

|   |
|---|
| <b>Roadway Subsystem</b>                |
| <i>NYSTA Sensors and CCTV Equipment</i> |

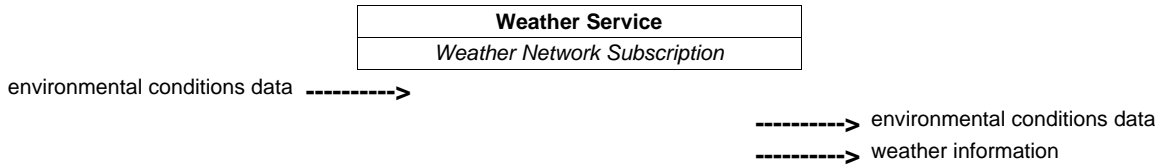
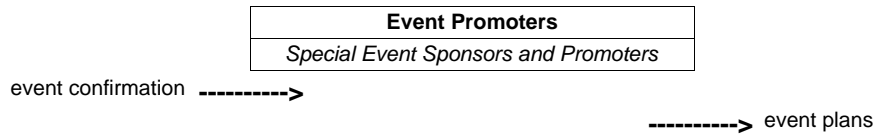
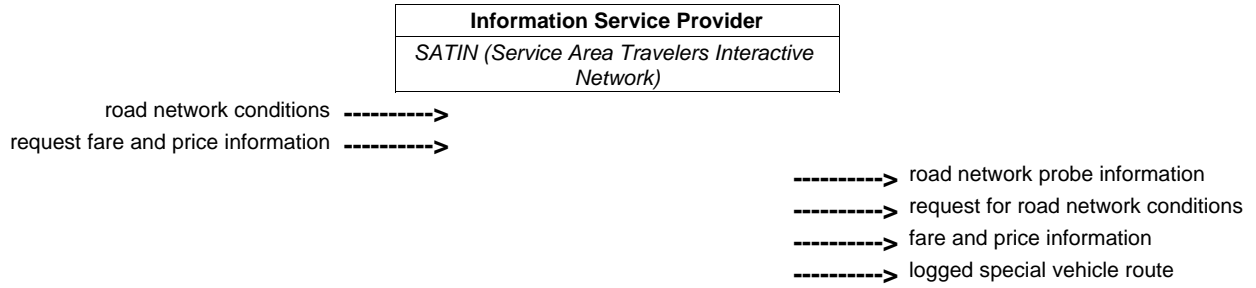
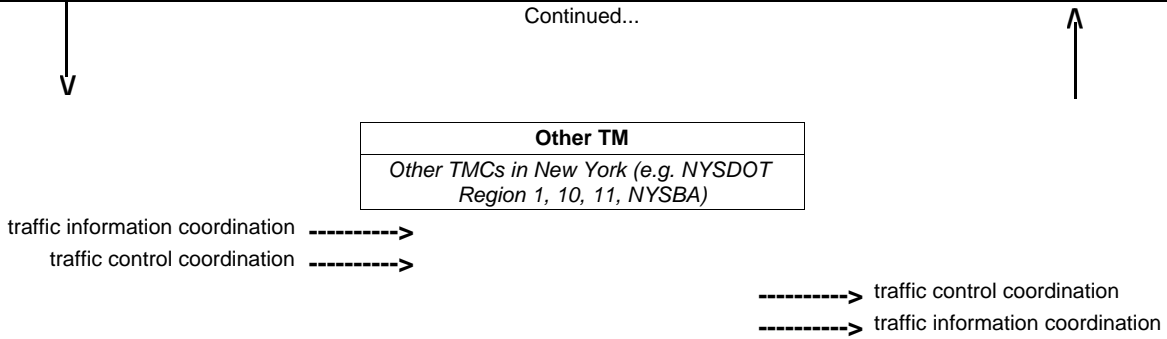
- traffic sensor control ----->
- environmental sensors control ----->
- freeway control data ----->
- speed monitoring control ----->
- video surveillance control ----->
- signal control data ----->

- > traffic images
- > freeway control status
- > request for right-of-way
- > intersection blockage notification
- > signal control status
- > traffic flow
- > speed monitoring information
- > vehicle probe data
- > reversible lane status





Continued...



|                                      |
|--------------------------------------|
| <b>Traffic Management</b>            |
| <i>NYSTA Tarrytown Equipment Hub</i> |



|   |
|---|
| <b>Archived Data Management Subsystem</b>                   |
| <i>NYSTA Infrastructure Inventory and Inspection System</i> |

traffic archive data ----->

-----> archive status  
 -----> archive requests

|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYSTA Maintenance and Construction</i>      |

field equipment status ----->  
 maint and constr resource request ----->  
 road network conditions ----->  
 work plan feedback ----->  
 incident information ----->

-----> road weather information  
 -----> roadway maintenance status  
 -----> maint and constr work plans  
 -----> maint and constr resource response  
 -----> incident information  
 -----> equipment maintenance status  
 -----> current asset restrictions  
 -----> work zone information

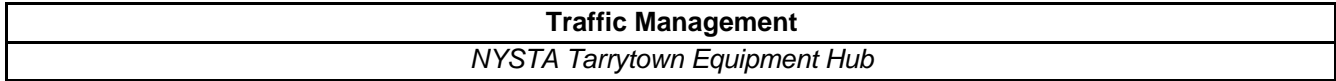
|  |
|--|
| <b>Archived Data Management Subsystem</b>  |
| <i>NYSTA Maintenance Management System</i> |

-----> archive requests  
 -----> archive status

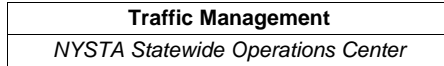
|   |
|---|
| <b>Roadway Subsystem</b>                |
| <i>NYSTA Sensors and CCTV Equipment</i> |

video surveillance control ----->  
 environmental sensors control ----->  
 freeway control data ----->  
 signal control data ----->  
 traffic sensor control ----->  
 speed monitoring control ----->

-----> reversible lane status  
 -----> freeway control status  
 -----> request for right-of-way  
 -----> signal control status  
 -----> speed monitoring information  
 -----> traffic flow  
 -----> traffic images  
 -----> environmental conditions data  
 -----> intersection blockage notification

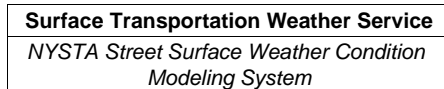


Continued...



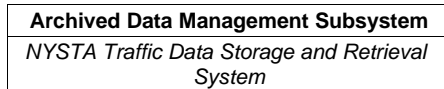
traffic control coordination ----->  
 traffic information coordination ----->

-----> traffic control coordination  
 -----> traffic information coordination



environmental conditions data ----->  
 transportation weather information request ----->

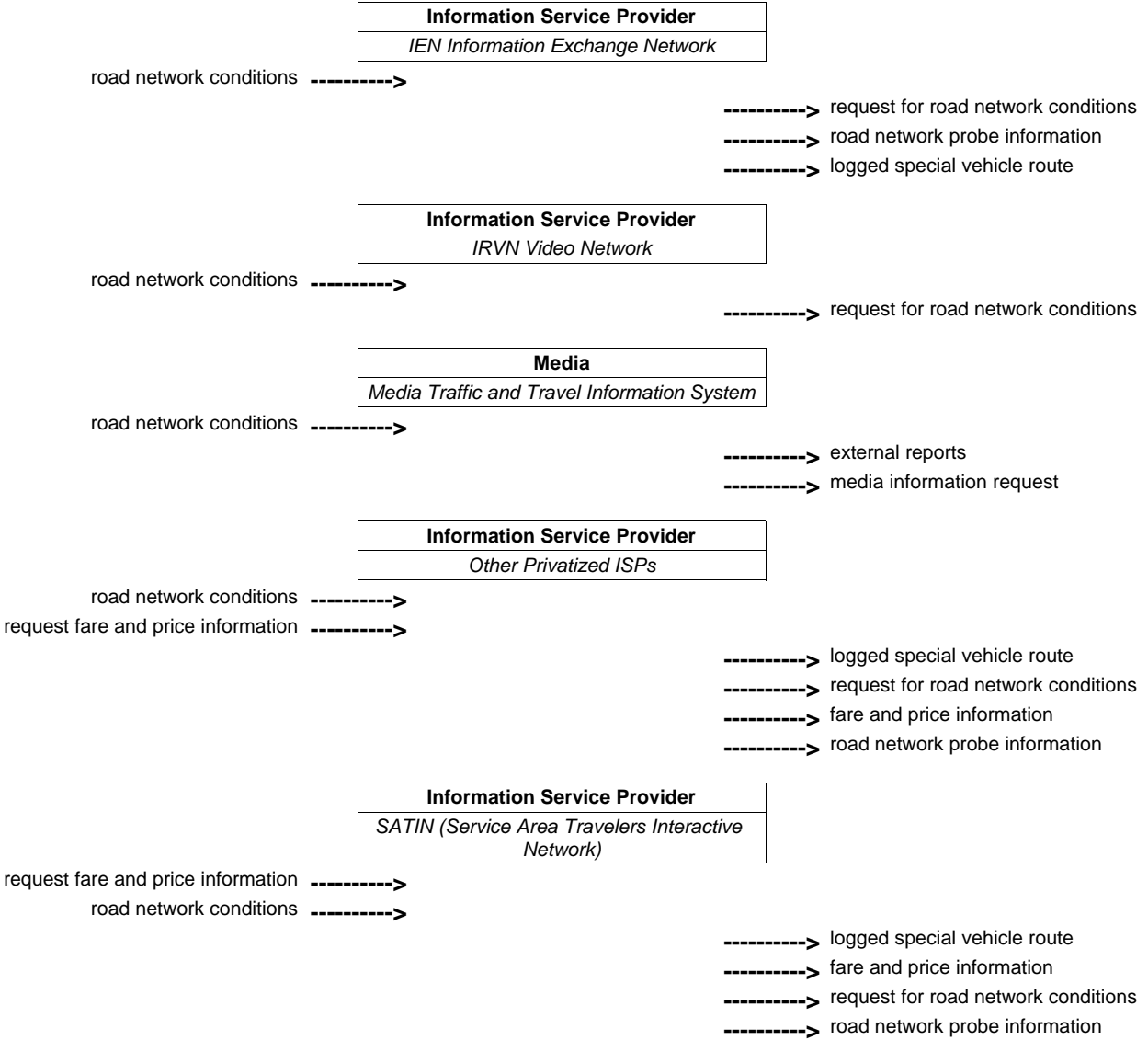
-----> environmental conditions data  
 -----> transportation weather information

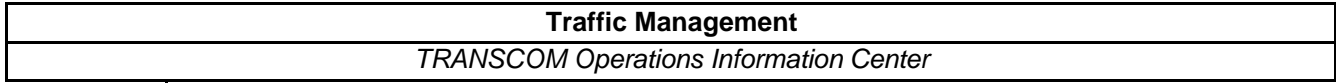


traffic archive data ----->

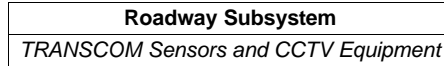
-----> archive requests  
 -----> archive status

|   |
|---|
| <b>Traffic Management</b>                     |
| <i>TRANSCOM Operations Information Center</i> |



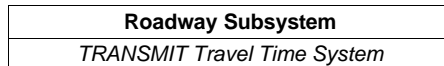


Continued...

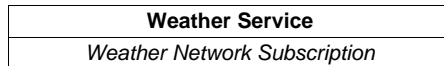


- freeway control data ----->
- hri control data ----->
- environmental sensors control ----->
- signal control data ----->
- hri request ----->
- speed monitoring control ----->
- traffic sensor control ----->
- video surveillance control ----->

- > freeway control status
- > environmental probe data
- > hri status
- > intersection blockage notification
- > request for right-of-way
- > reversible lane status
- > signal control status
- > speed monitoring information
- > traffic flow
- > traffic images
- > vehicle probe data
- > environmental conditions data



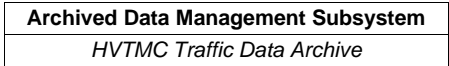
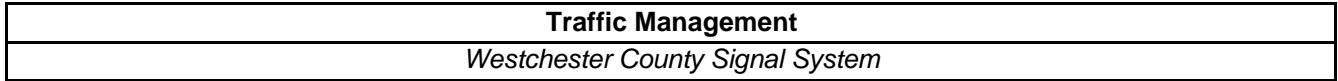
- > vehicle probe data



- environmental conditions data ----->

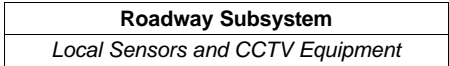
- > environmental conditions data
- > weather information





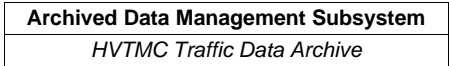
traffic archive data ----->

-----> archive status  
 -----> archive requests



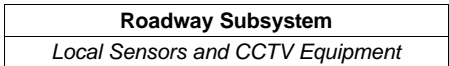
traffic sensor control ----->  
 signal control data ----->

-----> traffic flow  
 -----> signal control status  
 -----> reversible lane status  
 -----> request for right-of-way  
 -----> intersection blockage notification



traffic archive data ----->

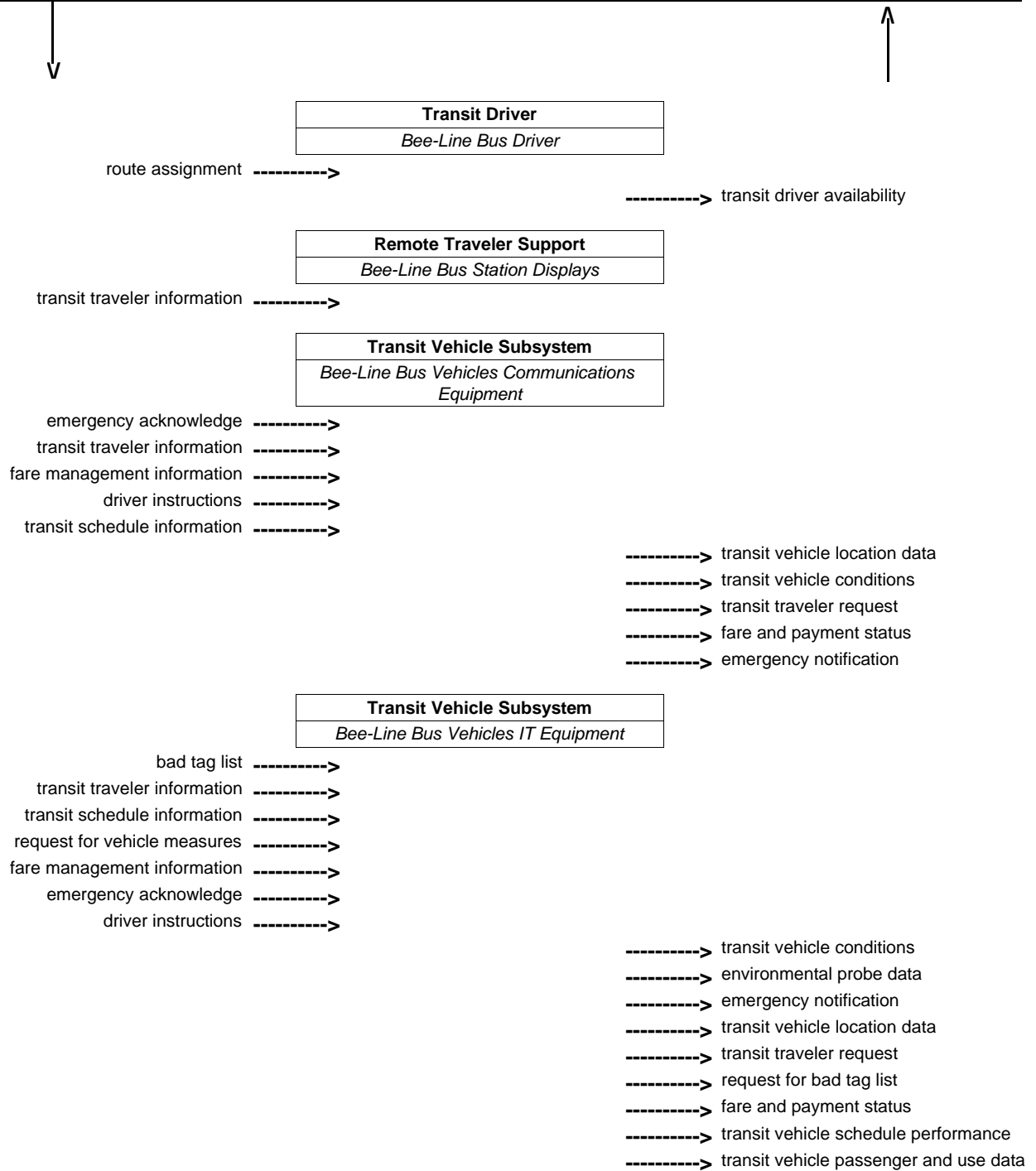
-----> archive status  
 -----> archive requests



traffic sensor control ----->  
 signal control data ----->

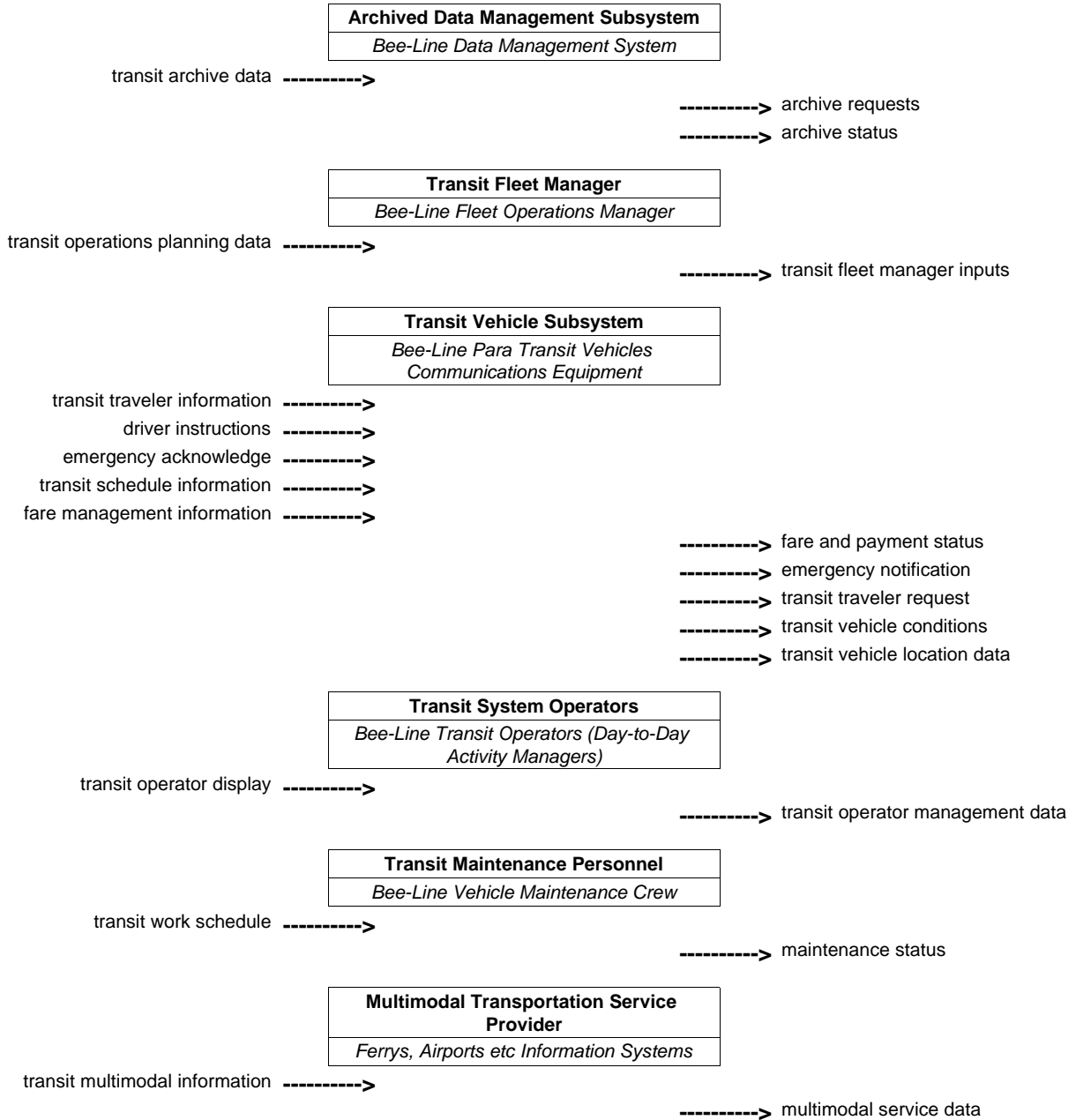
-----> traffic flow  
 -----> signal control status  
 -----> reversible lane status  
 -----> request for right-of-way  
 -----> intersection blockage notification

|  |
|--|
| <b>Transit Management</b>                      |
| <i>Bee-Line Bus Operations Dispatch System</i> |



|  |
|--|
| <b>Transit Management</b>                      |
| <i>Bee-Line Bus Operations Dispatch System</i> |

Continued...



|  |
|--|
| <b>Transit Management</b>                      |
| <i>Bee-Line Bus Operations Dispatch System</i> |

Continued...



|  |
|--|
| <b>Traffic Management</b>              |
| <i>HVTMC Freeway Management System</i> |

request for road network conditions ----->  
 transit system data ----->  
 transit demand management response ----->  
 traffic control priority request ----->  
 road network probe information ----->

-----> road network conditions  
 -----> traffic control priority status  
 -----> request transit information  
 -----> transit demand management request

|   |
|---|
| <b>Information Service Provider</b>           |
| <i>HVTMC ITS Information Service Provider</i> |

demand responsive transit plan ----->  
 transit request confirmation ----->  
 transit incident information ----->  
 transit and fare schedules ----->

-----> demand responsive transit request  
 -----> selected routes  
 -----> transit information request

|                                 |
|---------------------------------|
| <b>Emergency Management</b>     |
| <i>Local Emergency Dispatch</i> |

transit emergency data ----->

-----> transit emergency coordination data

|  |
|--|
| <b>Media</b>                                       |
| <i>Media Traffic and Travel Information System</i> |

transit incidents for media ----->  
 transit information for media ----->

-----> media information request

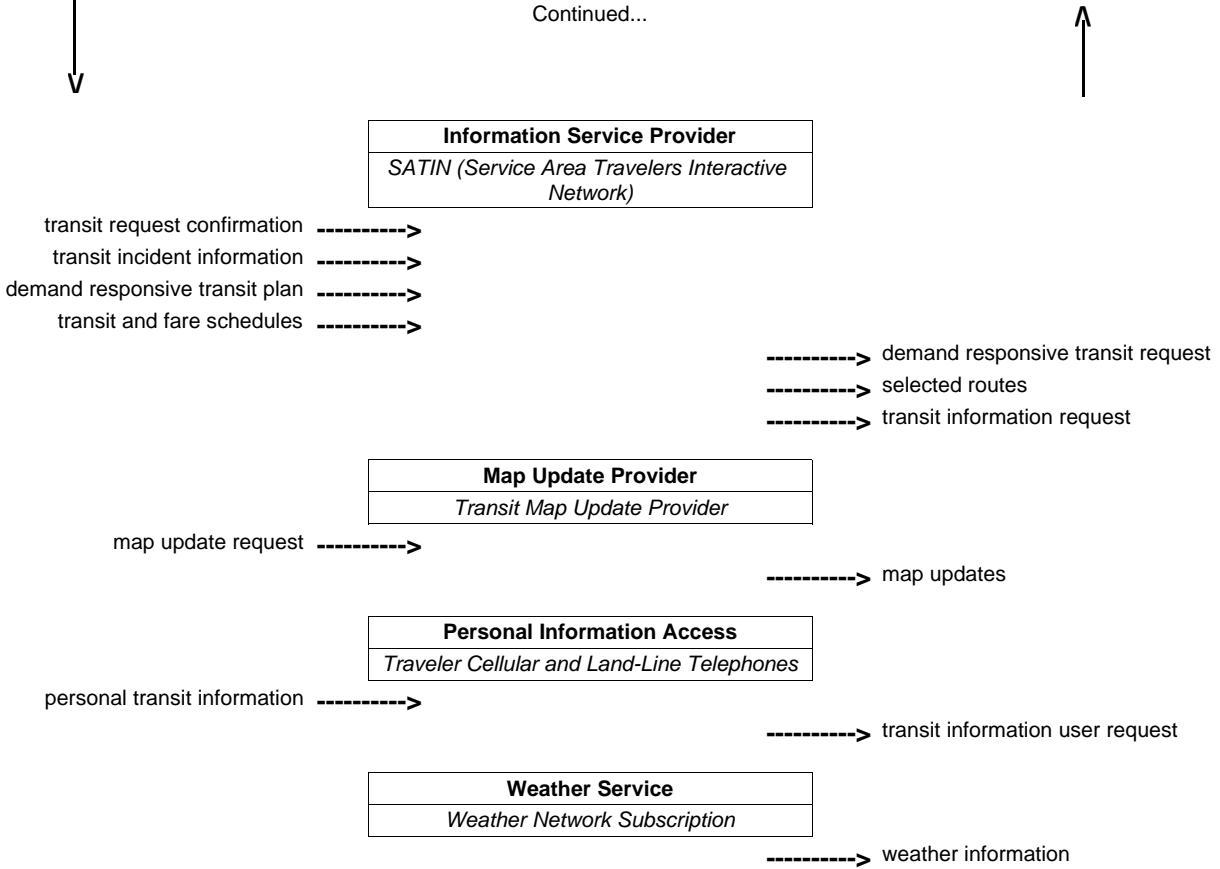
|  |
|--|
| <b>Emergency Management</b>                |
| <i>NYSP Central Communication/Dispatch</i> |

transit emergency data ----->

-----> transit emergency coordination data

|  |
|--|
| <b>Transit Management</b>                      |
| <i>Bee-Line Bus Operations Dispatch System</i> |

Continued...



|  |
|--|
| <b>Transit Management</b>              |
| <i>City / Local Transit Operations</i> |



|   |
|---|
| <b>Multimodal Transportation Service Provider</b> |
| <i>Ferrys, Airports etc Information Systems</i>   |

transit multimodal information ----->

-----> multimodal service data

|                                 |
|---------------------------------|
| <b>Emergency Management</b>     |
| <i>Local Emergency Dispatch</i> |

transit emergency data ----->

-----> transit emergency coordination data

|  |
|--|
| <b>Media</b>                                       |
| <i>Media Traffic and Travel Information System</i> |

transit information for media ----->

transit incidents for media ----->

-----> media information request

|   |
|---|
| <b>Information Service Provider</b>                       |
| <i>SATIN (Service Area Travelers Interactive Network)</i> |

transit request confirmation ----->

transit incident information ----->

transit and fare schedules ----->

demand responsive transit plan ----->

-----> transit information request

-----> selected routes

-----> demand responsive transit request

|  |
|--|
| <b>Transit Management</b>                |
| <i>Dutchess LOOP Bus Dispatch System</i> |



|                                 |
|---------------------------------|
| <b>Transit Driver</b>           |
| <i>Dutchess LOOP Bus Driver</i> |

route assignment ----->

-----> transit driver availability

|   |
|---|
| <b>Transit Fleet Manager</b>                      |
| <i>Dutchess LOOP Bus Fleet Operations Manager</i> |

transit operations planning data ----->

-----> transit fleet manager inputs

|   |
|---|
| <b>Transit Maintenance Personnel</b>              |
| <i>Dutchess LOOP Bus Vehicle Maintenance Crew</i> |

transit work schedule ----->

-----> maintenance status

|  |
|--|
| <b>Transit Vehicle Subsystem</b>                               |
| <i>Dutchess LOOP Bus Vehicles<br/>Communications Equipment</i> |

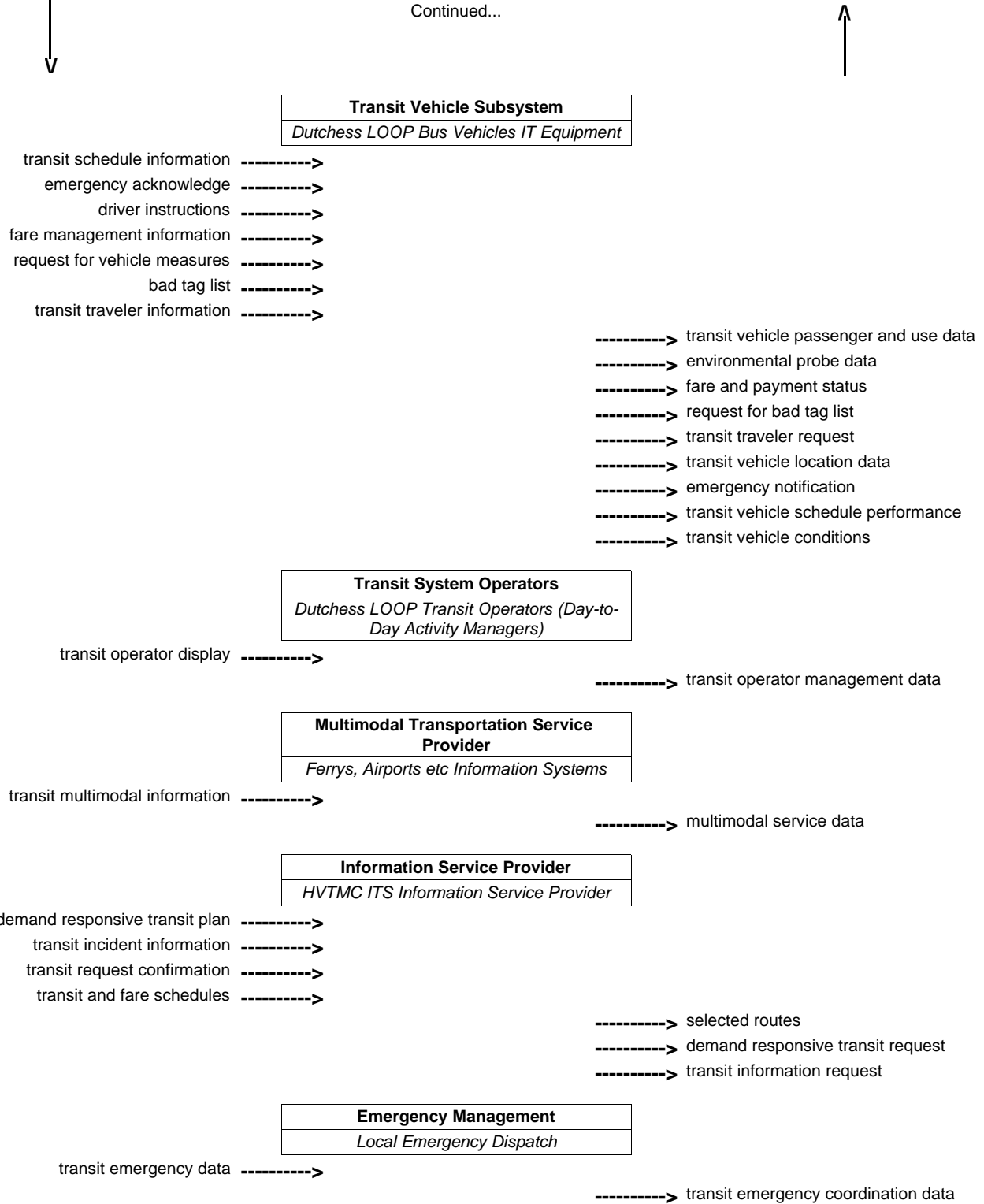
driver instructions ----->  
 transit traveler information ----->  
 transit schedule information ----->  
 fare management information ----->  
 emergency acknowledge ----->

-----> transit vehicle conditions  
 -----> transit traveler request  
 -----> fare and payment status  
 -----> emergency notification  
 -----> transit vehicle location data



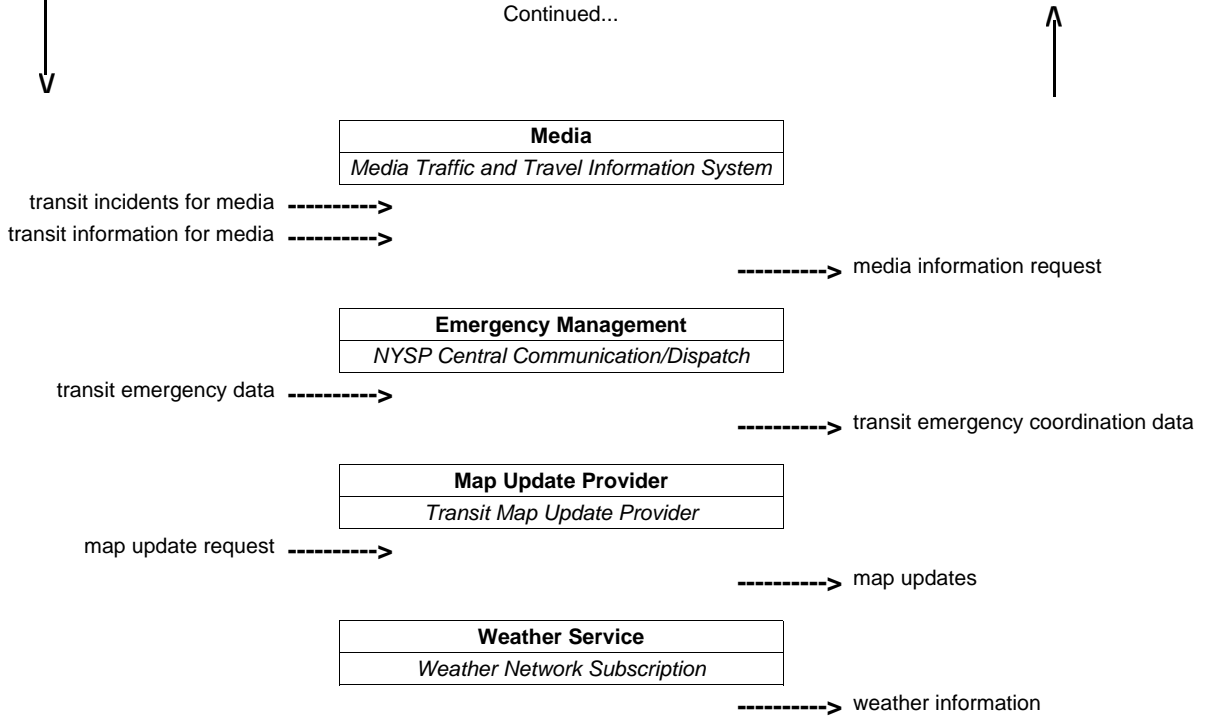
|  |
|--|
| <b>Transit Management</b>                |
| <i>Dutchess LOOP Bus Dispatch System</i> |

Continued...

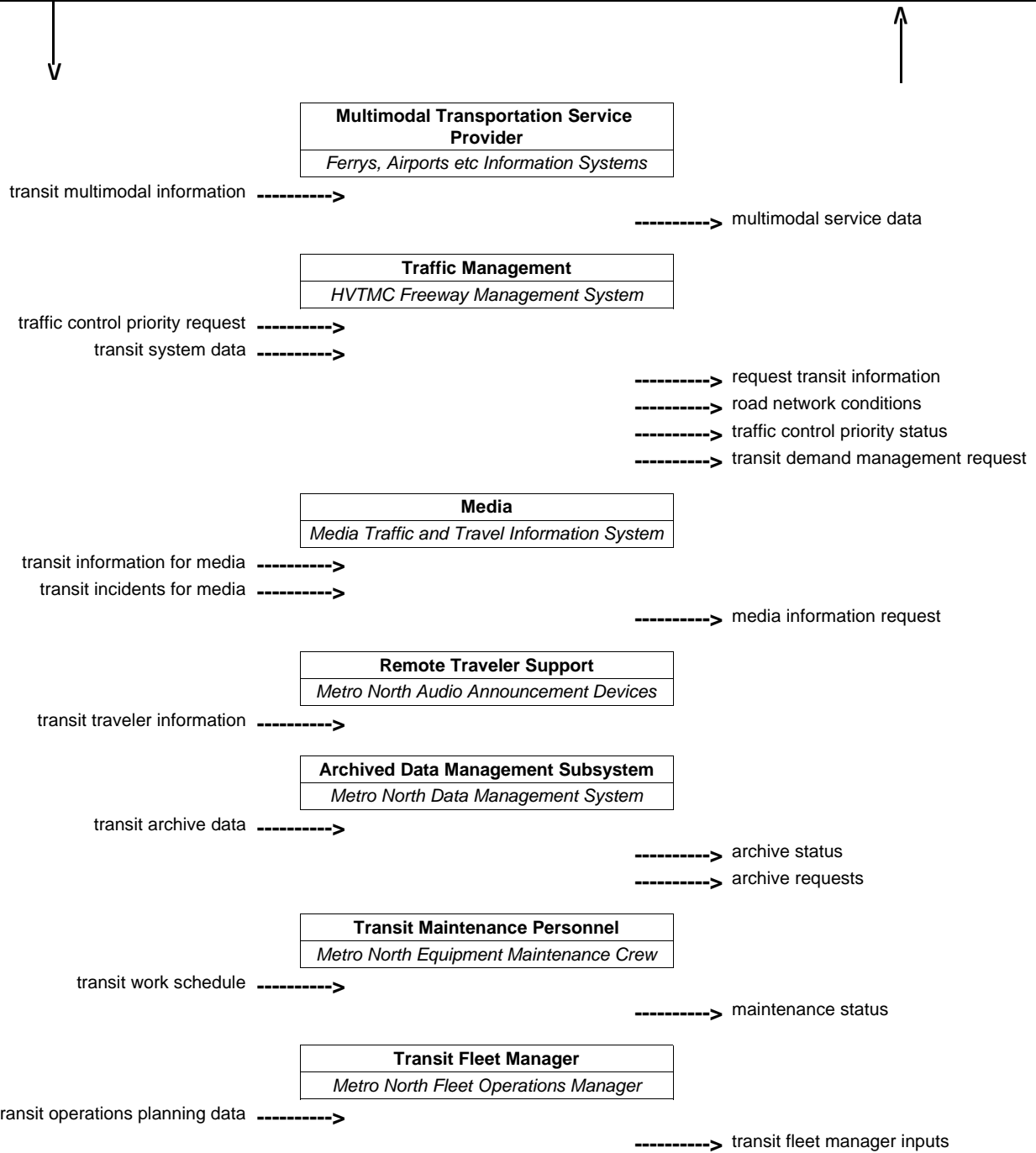


|  |
|--|
| <b>Transit Management</b>                |
| <i>Dutchess LOOP Bus Dispatch System</i> |

Continued...



|  |
|--|
| <b>Transit Management</b>                        |
| <i>Metro North Rail Operation Control Center</i> |



|  |
|--|
| <b>Transit Management</b>                        |
| <i>Metro North Rail Operation Control Center</i> |

Continued...



|   |
|---|
| <b>Transit Vehicle Subsystem</b>                          |
| <i>Metro North Rail Vehicles Communications Equipment</i> |

- transit traveler information ----->
- driver instructions ----->
- transit schedule information ----->
- fare management information ----->
- emergency acknowledge ----->

- > transit vehicle location data
- > transit vehicle conditions
- > transit traveler request
- > fare and payment status
- > emergency notification

|   |
|---|
| <b>Transit Vehicle Subsystem</b>              |
| <i>Metro North Rail Vehicles IT Equipment</i> |

- bad tag list ----->
- transit traveler information ----->
- transit schedule information ----->
- request for vehicle measures ----->
- fare management information ----->
- driver instructions ----->
- emergency acknowledge ----->

- > fare and payment status
- > transit vehicle schedule performance
- > emergency notification
- > transit vehicle location data
- > transit vehicle conditions
- > transit traveler request
- > request for bad tag list
- > transit vehicle passenger and use data

|   |
|---|
| <b>Transit System Operators</b>   |
| <i>Metro North Superintendent of Operations Services (Day-to-Day Activity Managers)</i> |

- transit operator display ----->

- > transit operator management data

|                                    |
|------------------------------------|
| <b>Transit Driver</b>              |
| <i>Metro North Train Engineers</i> |

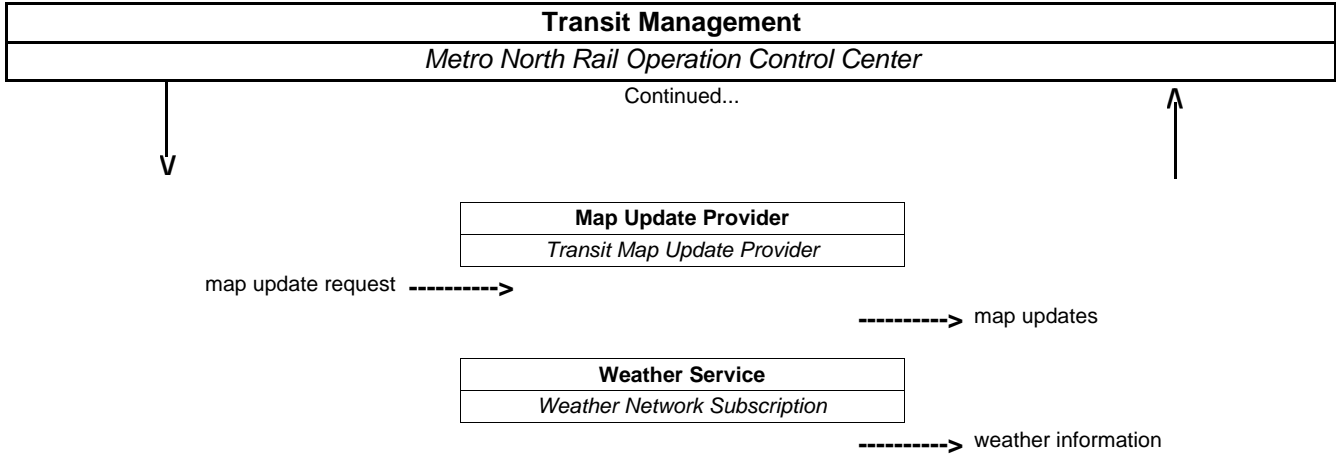
- route assignment ----->

- > transit driver availability

|                             |
|-----------------------------|
| <b>Emergency Management</b> |
| <i>MTA Police</i>           |

- transit emergency data ----->

- > transit emergency coordination data



|                           |
|---------------------------|
| <b>Transit Management</b> |
| <i>PART Bus System</i>    |



|   |
|---|
| <b>Multimodal Transportation Service Provider</b> |
| <i>Ferrys, Airports etc Information Systems</i>   |

transit multimodal information ----->

-----> multimodal service data

|  |
|--|
| <b>Traffic Management</b>              |
| <i>HVTMC Freeway Management System</i> |

request for road network conditions ----->

road network probe information ----->

traffic control priority request ----->

transit demand management response ----->

transit system data ----->

-----> request transit information

-----> road network conditions

-----> traffic control priority status

-----> transit demand management request

|   |
|---|
| <b>Information Service Provider</b>           |
| <i>HVTMC ITS Information Service Provider</i> |

demand responsive transit plan ----->

transit request confirmation ----->

transit and fare schedules ----->

transit incident information ----->

-----> transit information request

-----> demand responsive transit request

-----> selected routes

|                                 |
|---------------------------------|
| <b>Emergency Management</b>     |
| <i>Local Emergency Dispatch</i> |

transit emergency data ----->

-----> transit emergency coordination data

|  |
|--|
| <b>Media</b>                                       |
| <i>Media Traffic and Travel Information System</i> |

transit incidents for media ----->

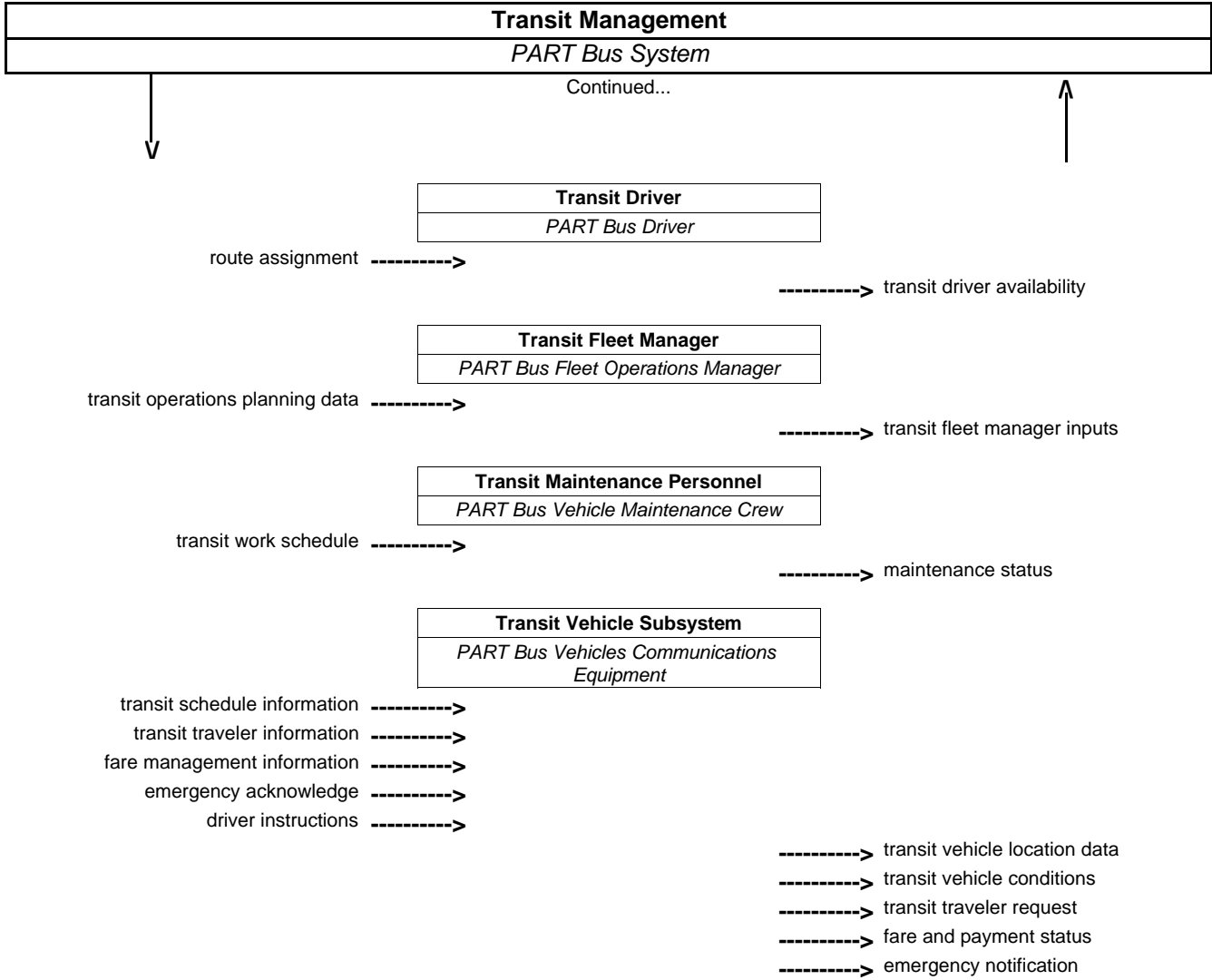
transit information for media ----->

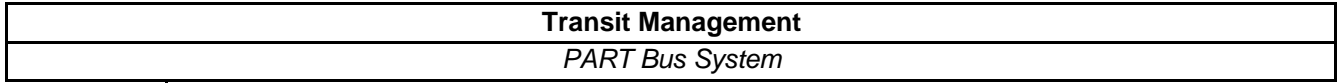
-----> media information request

|  |
|--|
| <b>Emergency Management</b>                |
| <i>NYSP Central Communication/Dispatch</i> |

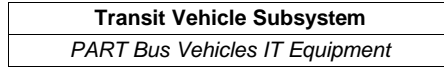
transit emergency data ----->

-----> transit emergency coordination data



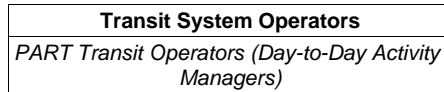


Continued...



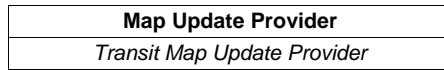
- bad tag list ----->
- transit schedule information ----->
- request for vehicle measures ----->
- fare management information ----->
- emergency acknowledge ----->
- driver instructions ----->
- transit traveler information ----->

- > transit traveler request
- > transit vehicle schedule performance
- > transit vehicle passenger and use data
- > transit vehicle conditions
- > request for bad tag list
- > fare and payment status
- > environmental probe data
- > emergency notification
- > transit vehicle location data



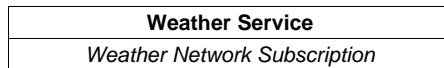
transit operator display ----->

-----> transit operator management data



map update request ----->

-----> map updates



-----> weather information



|                           |
|---------------------------|
| <b>Transit Management</b> |
| <i>Rockland TOR</i>       |



|   |
|---|
| <b>Multimodal Transportation Service Provider</b> |
| <i>Ferrys, Airports etc Information Systems</i>   |

transit multimodal information ----->

-----> multimodal service data

|  |
|--|
| <b>Traffic Management</b>              |
| <i>HVTMC Freeway Management System</i> |

request for road network conditions ----->

road network probe information ----->

traffic control priority request ----->

transit demand management response ----->

transit system data ----->

-----> request transit information

-----> road network conditions

-----> traffic control priority status

-----> transit demand management request

|   |
|---|
| <b>Information Service Provider</b>           |
| <i>HVTMC ITS Information Service Provider</i> |

demand responsive transit plan ----->

transit request confirmation ----->

transit and fare schedules ----->

transit incident information ----->

-----> transit information request

-----> demand responsive transit request

-----> selected routes

|                                 |
|---------------------------------|
| <b>Emergency Management</b>     |
| <i>Local Emergency Dispatch</i> |

transit emergency data ----->

-----> transit emergency coordination data

|  |
|--|
| <b>Media</b>                                       |
| <i>Media Traffic and Travel Information System</i> |

transit incidents for media ----->

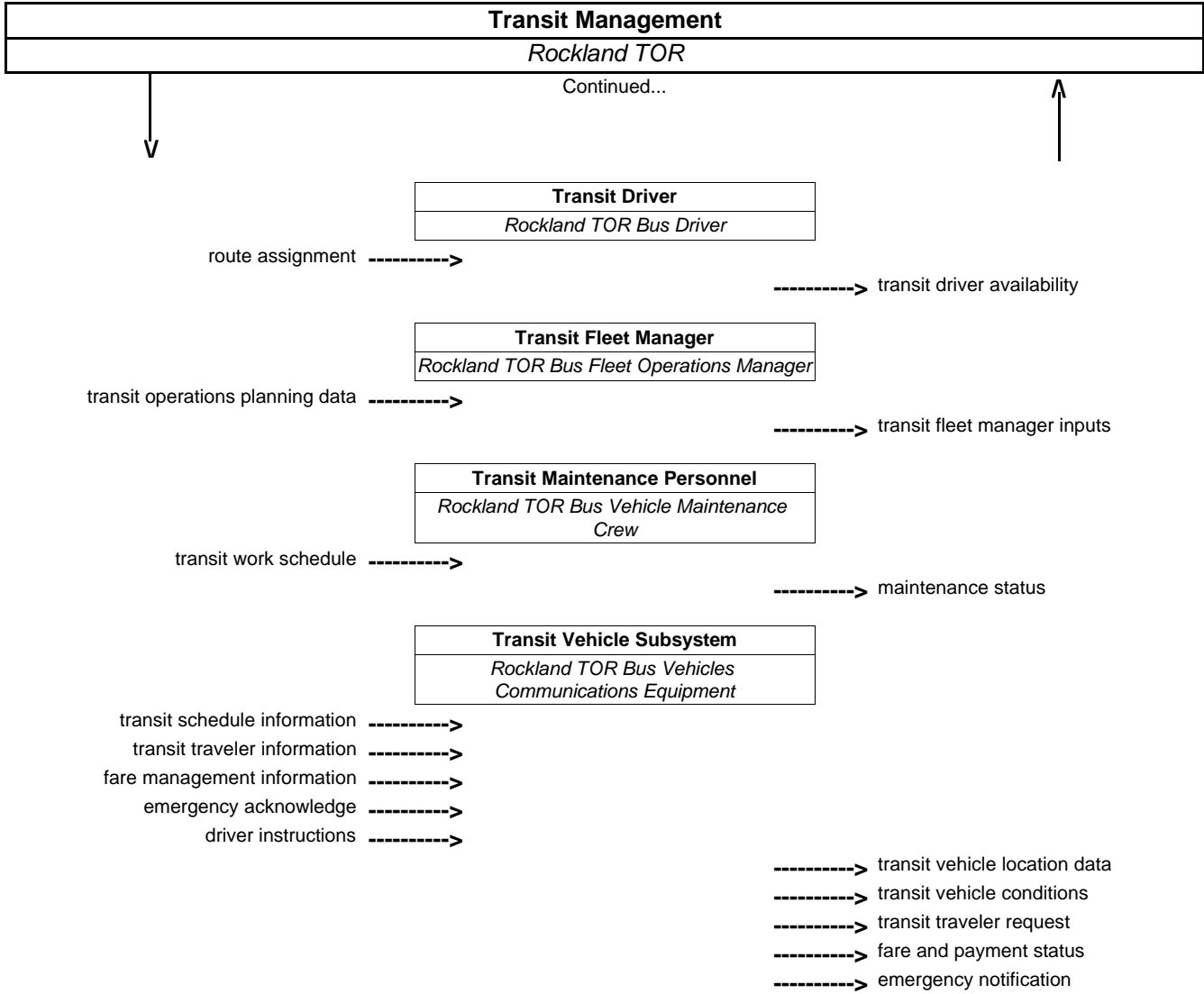
transit information for media ----->

-----> media information request

|  |
|--|
| <b>Emergency Management</b>                |
| <i>NYSP Central Communication/Dispatch</i> |

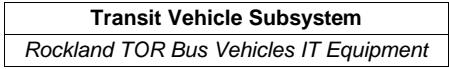
transit emergency data ----->

-----> transit emergency coordination data



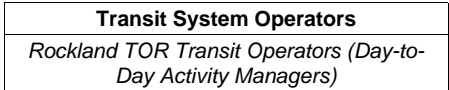


Continued...



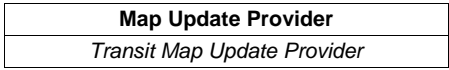
- bad tag list ----->
- transit schedule information ----->
- request for vehicle measures ----->
- fare management information ----->
- emergency acknowledge ----->
- driver instructions ----->
- transit traveler information ----->

- > transit traveler request
- > transit vehicle schedule performance
- > transit vehicle passenger and use data
- > transit vehicle conditions
- > request for bad tag list
- > fare and payment status
- > environmental probe data
- > emergency notification
- > transit vehicle location data



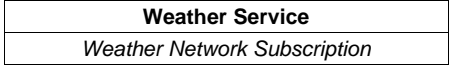
transit operator display ----->

-----> transit operator management data



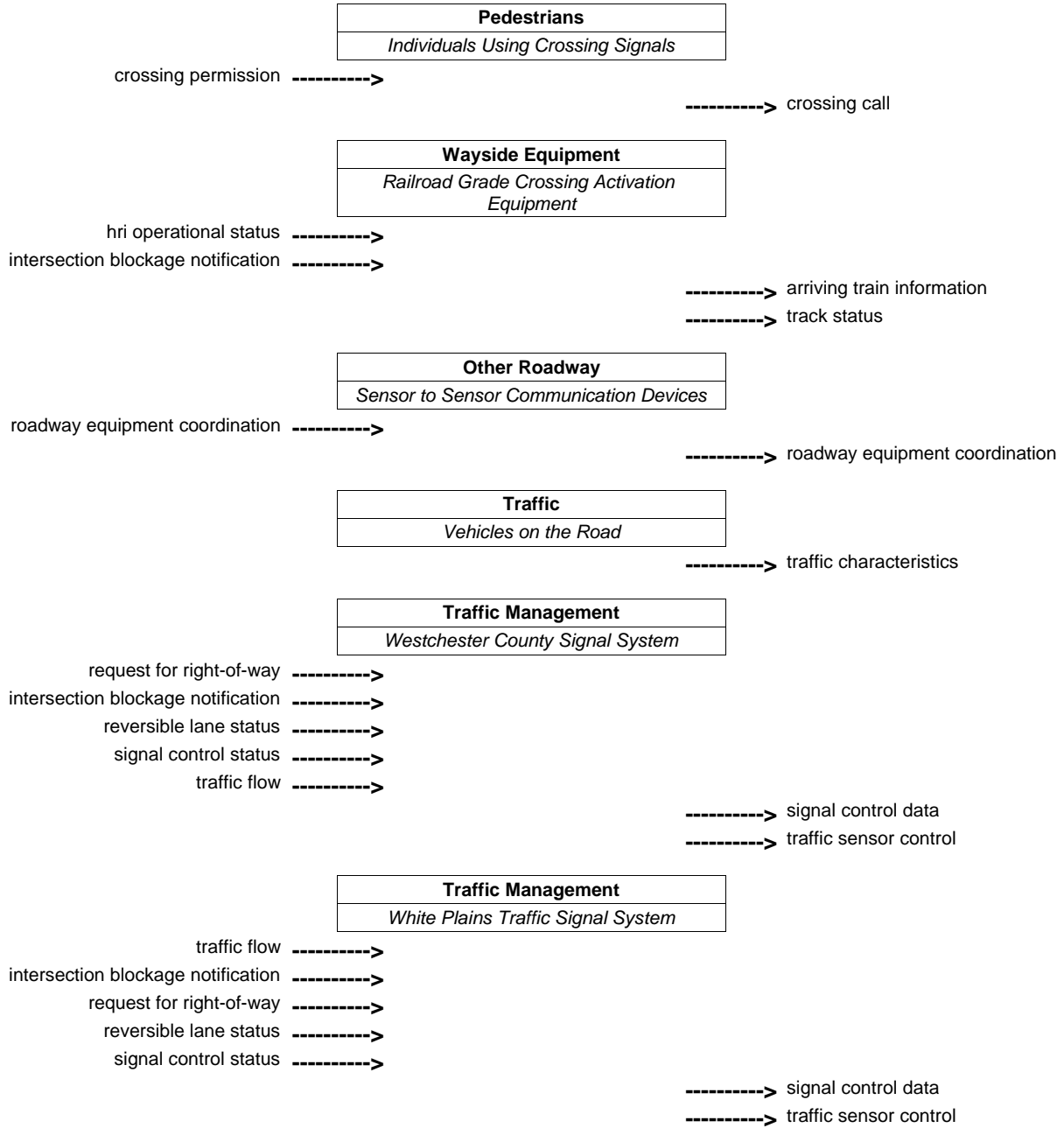
map update request ----->

-----> map updates



-----> weather information

|   |
|---|
| <b>Roadway Subsystem</b>                |
| <i>Local Sensors and CCTV Equipment</i> |



|   |
|---|
| <b>Roadway Subsystem</b>                |
| <i>NYSBA Sensors and CCTV Equipment</i> |



|  |
|--|
| <b>Vehicle Characteristics</b>                         |
| <i>Axle Spacing and Weight of Vehicles on the Road</i> |

-----> vehicle characteristics

|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYSBA Maintenance and Construction</i>      |

- speed monitoring information ----->
- traffic images ----->
- roadway information system status ----->
- infrastructure monitoring sensor data ----->
- field device status ----->
- work zone warning status ----->
- environmental conditions data ----->

- > work zone warning device control
- > video surveillance control
- > speed monitoring control
- > environmental sensors control
- > infrastructure monitoring sensor control

|   |
|---|
| <b>Maintenance and Construction Field Personnel</b> |
| <i>NYSBA Maintenance Field Personnel</i>            |

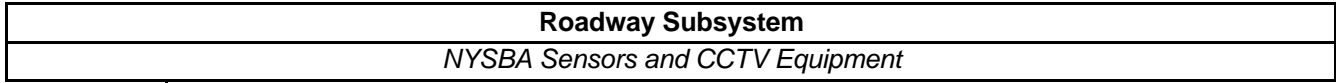
work zone warning ----->

-----> crew movements

|                                |
|--------------------------------|
| <b>Traffic Management</b>      |
| <i>NYSBA Operations Center</i> |

- speed monitoring information ----->
- freeway control status ----->
- intersection blockage notification ----->
- roadway information system status ----->
- reversible lane status ----->
- signal control status ----->
- environmental conditions data ----->
- traffic images ----->
- request for right-of-way ----->
- traffic flow ----->

- > freeway control data
- > environmental sensors control
- > roadway information system data
- > signal control data
- > speed monitoring control
- > traffic sensor control
- > video surveillance control

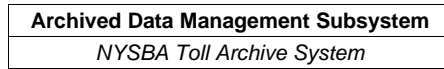


Continued...



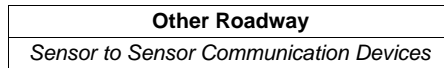
- intersection blockage notification ----->
- traffic images ----->
- traffic flow ----->
- speed monitoring information ----->
- signal control status ----->
- environmental conditions data ----->
- request for right-of-way ----->
- freeway control status ----->
- environmental probe data ----->
- reversible lane status ----->

- > environmental sensors control
- > freeway control data
- > signal control data
- > speed monitoring control
- > traffic sensor control
- > video surveillance control



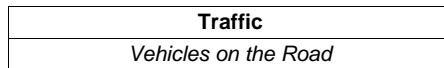
roadside archive data ----->

-----> data collection and monitoring control

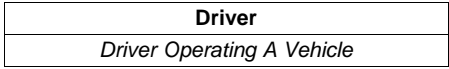
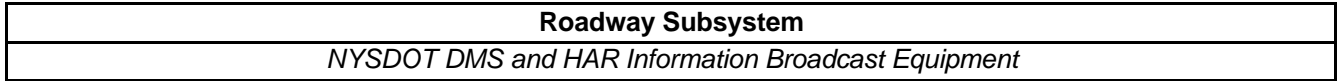


roadway equipment coordination ----->

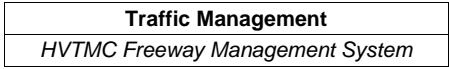
-----> roadway equipment coordination



-----> traffic characteristics



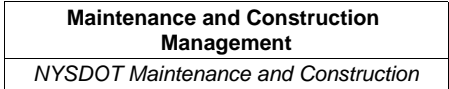
driver information ----->



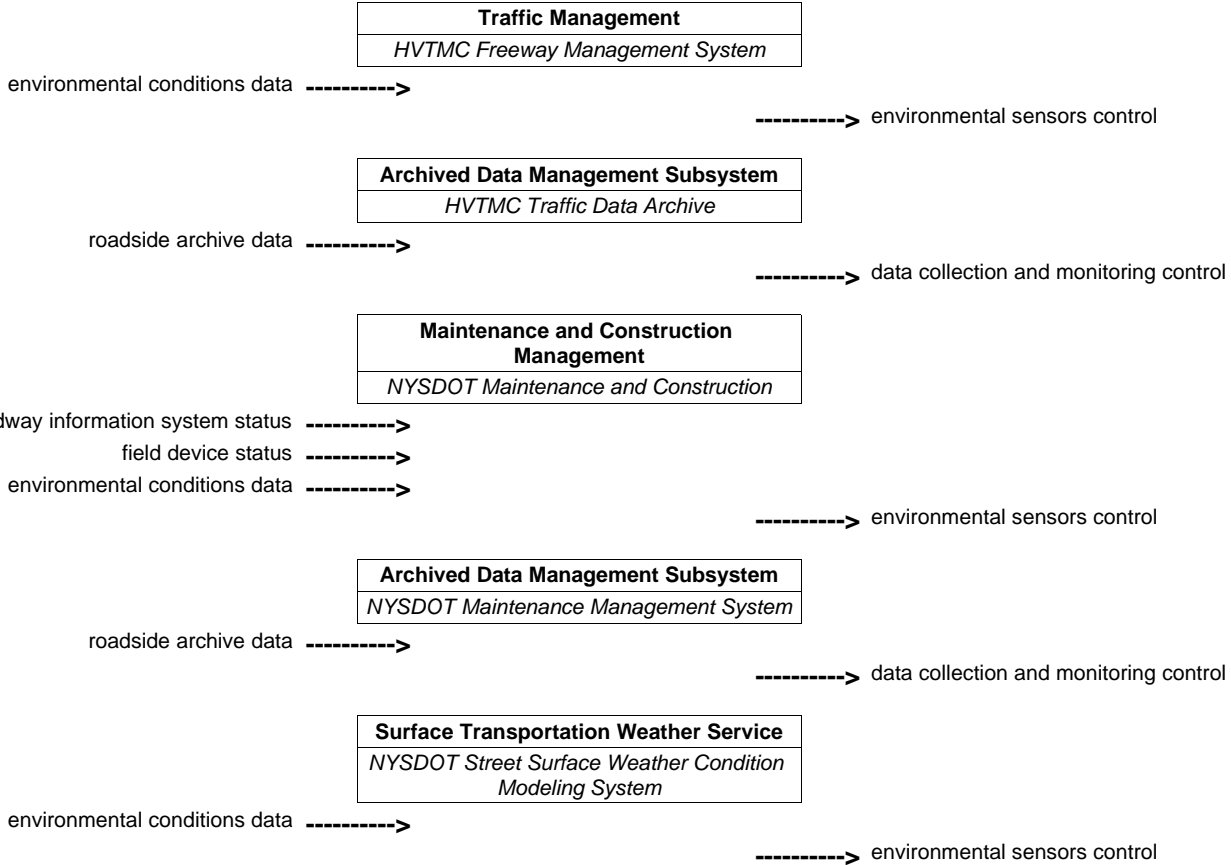
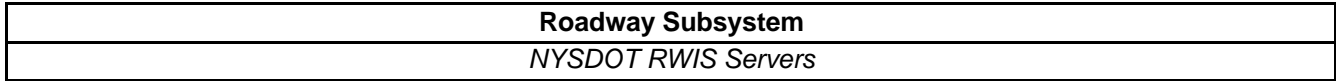
roadway information system status ----->

-----> roadway information system data

-----> freeway control data



field device status ----->





|   |
|---|
| <b>Roadway Subsystem</b>                  |
| <i>NYS DOT Sensors and CCTV Equipment</i> |



|  |
|--|
| <b>Traffic Management</b>              |
| <i>HVTMC Freeway Management System</i> |

- signal control status ----->
- emissions data ----->
- environmental conditions data ----->
- environmental probe data ----->
- freeway control status ----->
- hri status ----->
- intersection blockage notification ----->
- reversible lane status ----->
- speed monitoring information ----->
- traffic flow ----->
- traffic images ----->
- vehicle probe data ----->
- request for right-of-way ----->

- > environmental sensors control
- > AHS control information
- > hri request
- > signal control data
- > speed monitoring control
- > hri control data
- > freeway control data
- > video surveillance control
- > traffic sensor control

|   |
|---|
| <b>Archived Data Management Subsystem</b> |
| <i>HVTMC Traffic Data Archive</i>         |

roadside archive data ----->

-----> data collection and monitoring control

|   |
|---|
| <b>Maintenance and Construction Field Personnel</b> |
| <i>NYS DOT Maintenance Field Personnel</i>          |

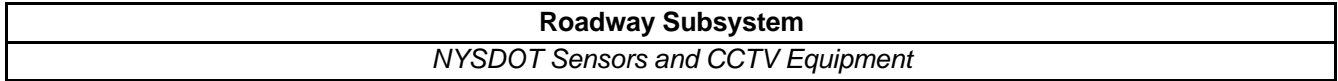
work zone warning ----->

-----> crew movements

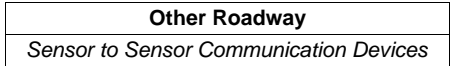
|   |
|---|
| <b>Wayside Equipment</b>                            |
| <i>Railroad Grade Crossing Activation Equipment</i> |

- hri operational status ----->
- intersection blockage notification ----->

- > arriving train information
- > track status

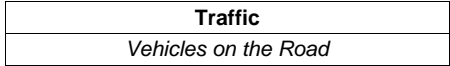


Continued...

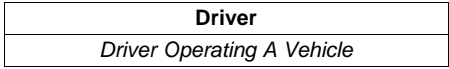
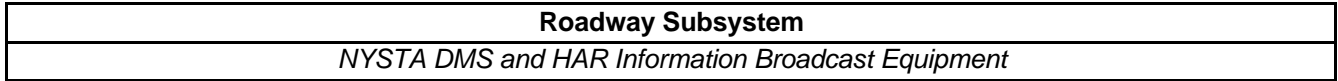


roadway equipment coordination ----->

-----> roadway equipment coordination



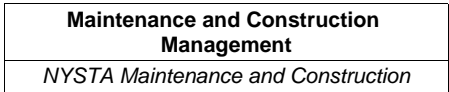
-----> traffic characteristics



driver information ----->



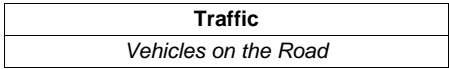
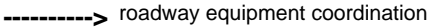
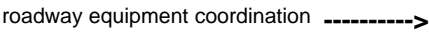
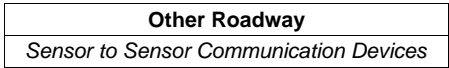
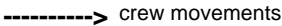
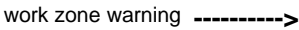
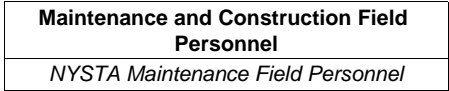
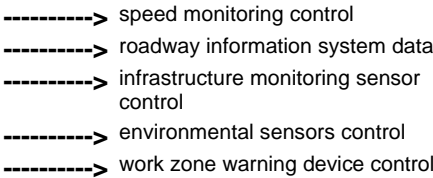
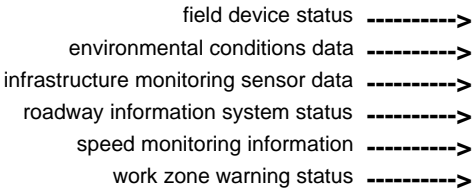
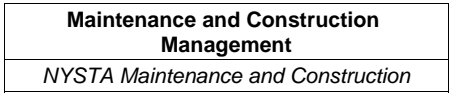
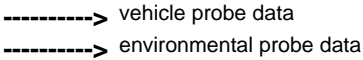
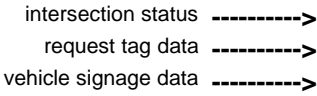
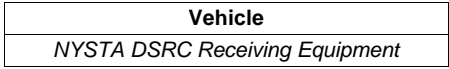
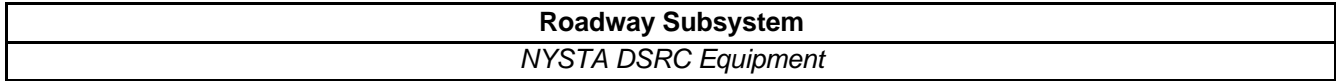
broadcast advisories ----->



roadway information system status ----->

field device status ----->

-----> roadway information system data



|   |
|---|
| <b>Roadway Subsystem</b>                |
| <i>NYSTA Sensors and CCTV Equipment</i> |



|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYSTA Maintenance and Construction</i>      |

- speed monitoring information ----->
- traffic images ----->
- infrastructure monitoring sensor data ----->
- field device status ----->
- environmental conditions data ----->
- work zone warning status ----->

- > work zone warning device control
- > video surveillance control
- > speed monitoring control
- > infrastructure monitoring sensor control
- > environmental sensors control

|   |
|---|
| <b>Maintenance and Construction Field Personnel</b> |
| <i>NYSTA Maintenance Field Personnel</i>            |

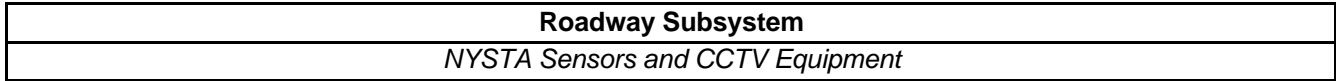
- work zone warning ----->

- > crew movements

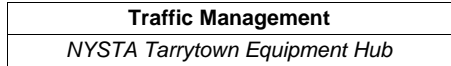
|  |
|--|
| <b>Traffic Management</b>                |
| <i>NYSTA Statewide Operations Center</i> |

- signal control status ----->
- traffic flow ----->
- freeway control status ----->
- intersection blockage notification ----->
- reversible lane status ----->
- speed monitoring information ----->
- vehicle probe data ----->
- request for right-of-way ----->
- traffic images ----->

- > freeway control data
- > environmental sensors control
- > signal control data
- > speed monitoring control
- > traffic sensor control
- > video surveillance control

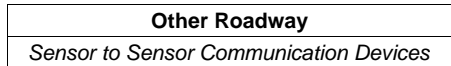


Continued...



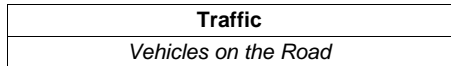
- freeway control status ----->
- traffic images ----->
- traffic flow ----->
- speed monitoring information ----->
- signal control status ----->
- reversible lane status ----->
- intersection blockage notification ----->
- environmental conditions data ----->
- request for right-of-way ----->

- > environmental sensors control
- > video surveillance control
- > freeway control data
- > signal control data
- > speed monitoring control
- > traffic sensor control

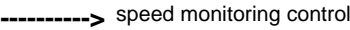
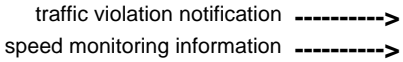
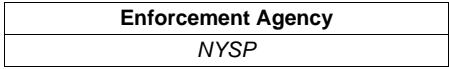
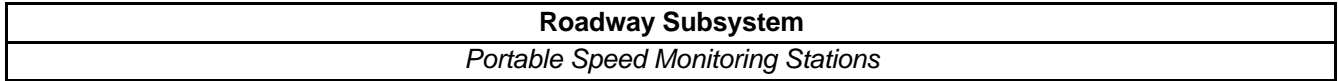


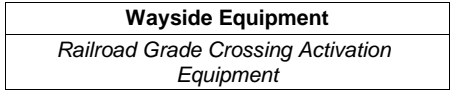
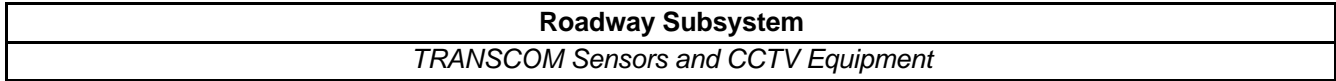
roadway equipment coordination ----->

-----> roadway equipment coordination



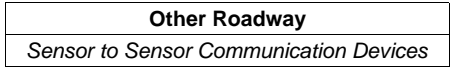
-----> traffic characteristics





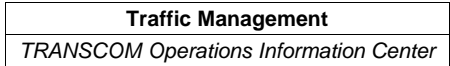
intersection blockage notification ----->  
 hri operational status ----->

-----> arriving train information  
 -----> track status



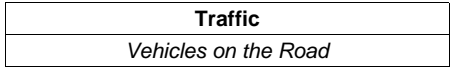
roadway equipment coordination ----->

-----> roadway equipment coordination



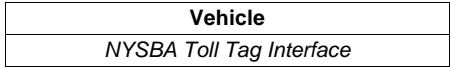
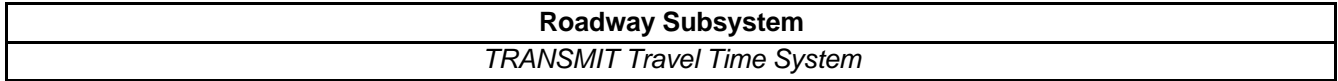
intersection blockage notification ----->  
 environmental probe data ----->  
 hri status ----->  
 environmental conditions data ----->  
 request for right-of-way ----->  
 reversible lane status ----->  
 signal control status ----->  
 speed monitoring information ----->  
 traffic flow ----->  
 traffic images ----->  
 vehicle probe data ----->  
 freeway control status ----->

-----> environmental sensors control  
 -----> freeway control data  
 -----> hri control data  
 -----> hri request  
 -----> signal control data  
 -----> speed monitoring control  
 -----> video surveillance control  
 -----> traffic sensor control



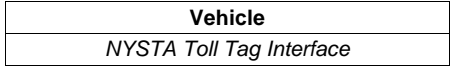
-----> traffic characteristics





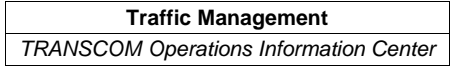
vehicle signage data ----->

-----> vehicle probe data

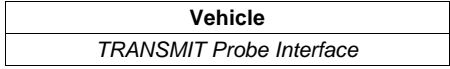


vehicle signage data ----->

-----> vehicle probe data

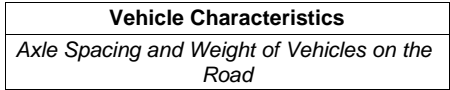
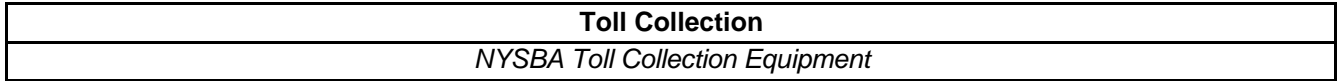


vehicle probe data ----->

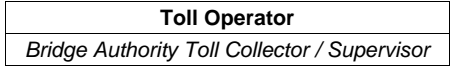


request tag data ----->

-----> vehicle probe data

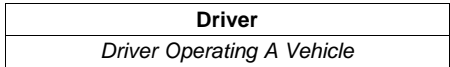


-----> vehicle characteristics

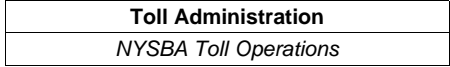


toll transaction reports ----->

-----> toll operator requests

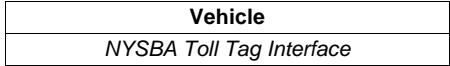


roadside transaction status ----->



toll transactions ----->

-----> toll instructions

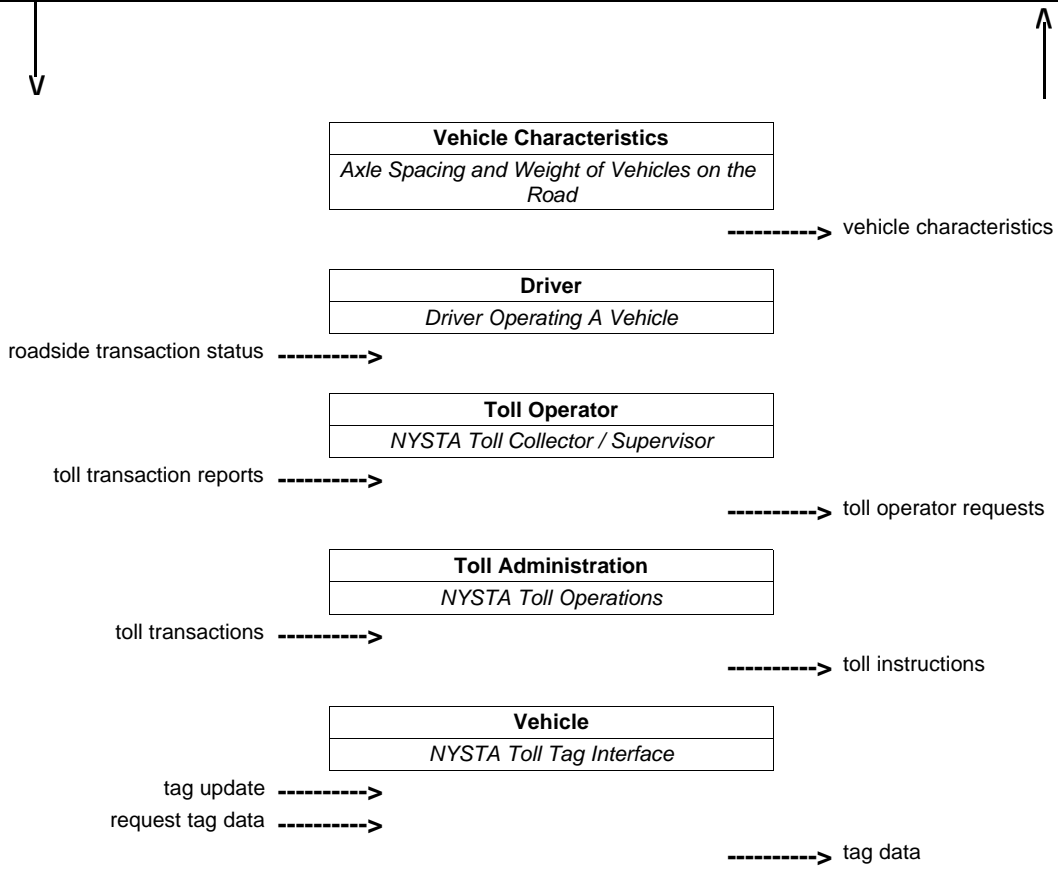


tag update ----->

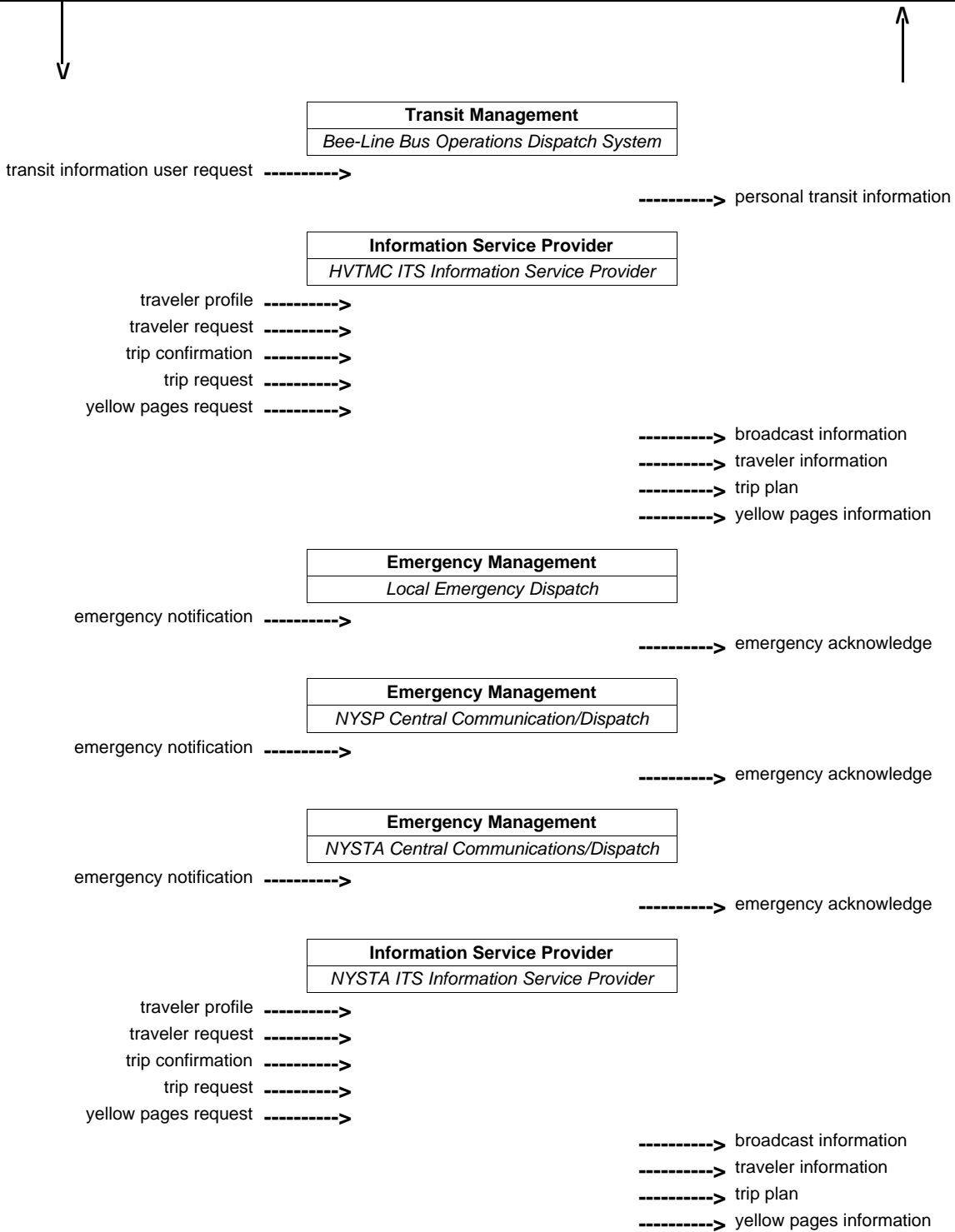
request tag data ----->

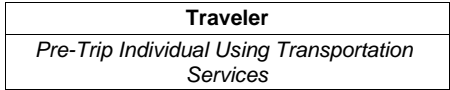
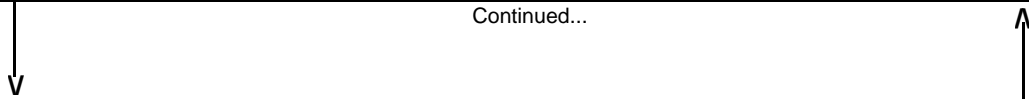
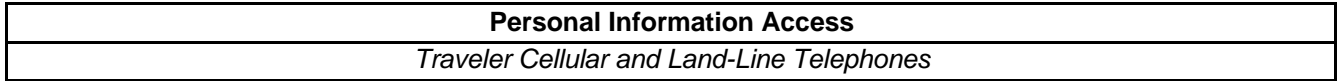
-----> tag data

|   |
|---|
| <b>Toll Collection</b>                            |
| <i>NYSTA Electronic Toll Collection Equipment</i> |



**Personal Information Access**  
*Traveler Cellular and Land-Line Telephones*





traveler interface updates ----->

-----> traveler inputs

**Personal Information Access**  
*Traveler PC/Info. Appliance*



**Information Service Provider**  
*HVTMC ITS Information Service Provider*

yellow pages request ----->  
 traveler profile ----->  
 traveler request ----->  
 trip request ----->  
 trip confirmation ----->

-----> traveler information  
 -----> trip plan  
 -----> yellow pages information  
 -----> broadcast information

**Information Service Provider**  
*NYSTA ITS Information Service Provider*

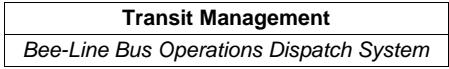
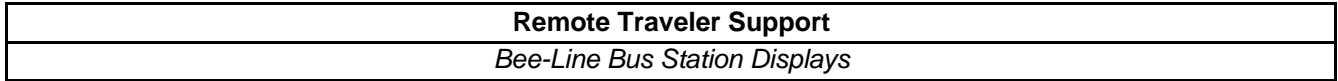
yellow pages request ----->  
 trip request ----->  
 trip confirmation ----->  
 traveler request ----->  
 traveler profile ----->

-----> traveler information  
 -----> trip plan  
 -----> yellow pages information  
 -----> broadcast information

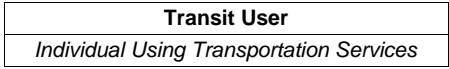
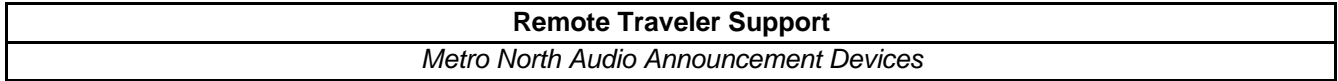
**Traveler**  
*Pre-Trip Individual Using Transportation Services*

traveler interface updates ----->

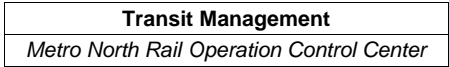
-----> traveler inputs



-----> transit traveler information



transit user outputs ----->



-----> transit traveler information



|                                |
|--------------------------------|
| <b>Remote Traveler Support</b> |
| <i>NYSDOT Kiosks</i>           |



|   |
|---|
| <b>Information Service Provider</b>           |
| <i>HVTMC ITS Information Service Provider</i> |

yellow pages request ----->  
 trip request ----->  
 trip confirmation ----->  
 traveler request ----->

-----> yellow pages information  
 -----> trip plan  
 -----> traveler information  
 -----> broadcast information

|   |
|---|
| <b>Transit User</b>                             |
| <i>Individual Using Transportation Services</i> |

transit user outputs ----->  
 transit user fare status ----->

-----> transit user inputs

|  |
|--|
| <b>Traveler</b>  |
| <i>Pre-Trip Individual Using Transportation Services</i> |

traveler interface updates ----->

-----> traveler inputs

|   |
|---|
| <b>Remote Traveler Support</b><br><i>NYSTA Service Plaza Kiosks</i> |
|---|



|  |
|--|
| <b>Transit User</b><br><i>Individual Using Transportation Services</i> |
|--|

transit user outputs ----->  
 transit user fare status ----->

-----> transit user inputs

|  |
|--|
| <b>Information Service Provider</b><br><i>NYSTA ITS Information Service Provider</i> |
|--|

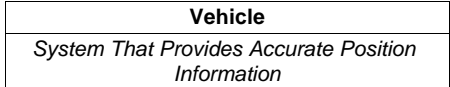
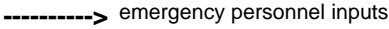
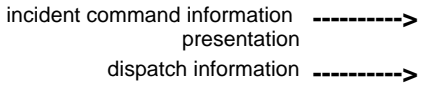
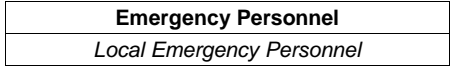
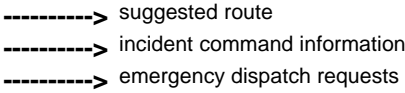
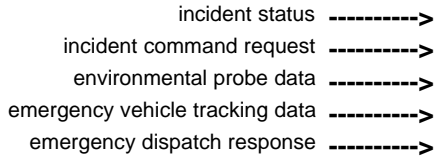
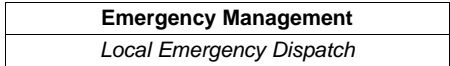
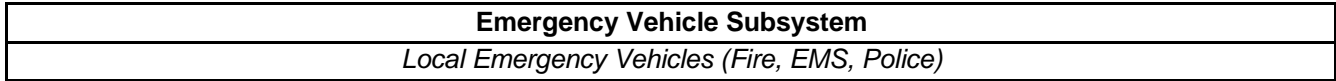
yellow pages request ----->  
 trip request ----->  
 trip confirmation ----->  
 traveler request ----->

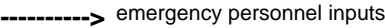
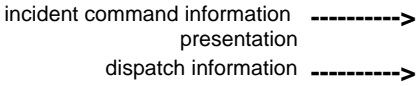
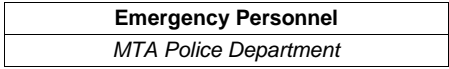
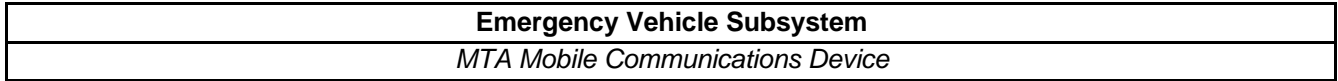
-----> yellow pages information  
 -----> trip plan  
 -----> traveler information  
 -----> broadcast information

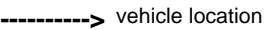
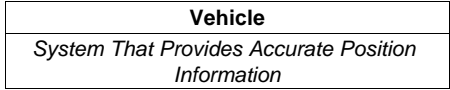
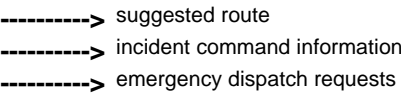
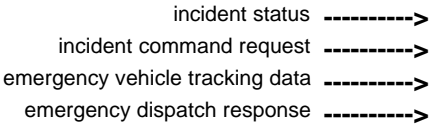
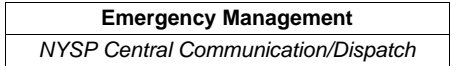
|   |
|---|
| <b>Traveler</b><br><i>Pre-Trip Individual Using Transportation Services</i> |
|---|

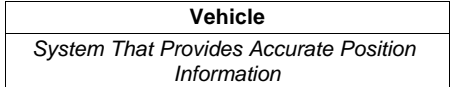
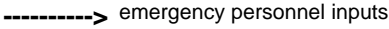
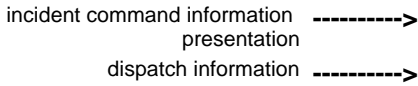
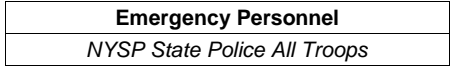
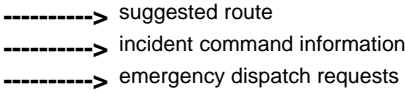
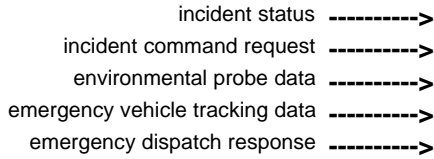
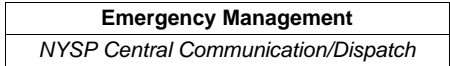
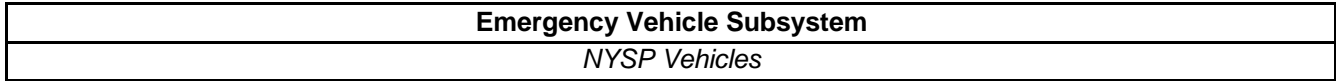
traveler interface updates ----->

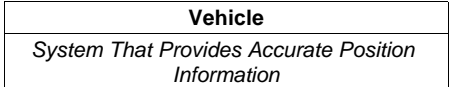
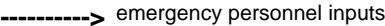
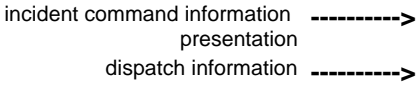
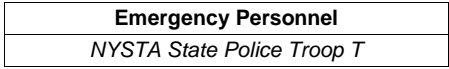
-----> traveler inputs

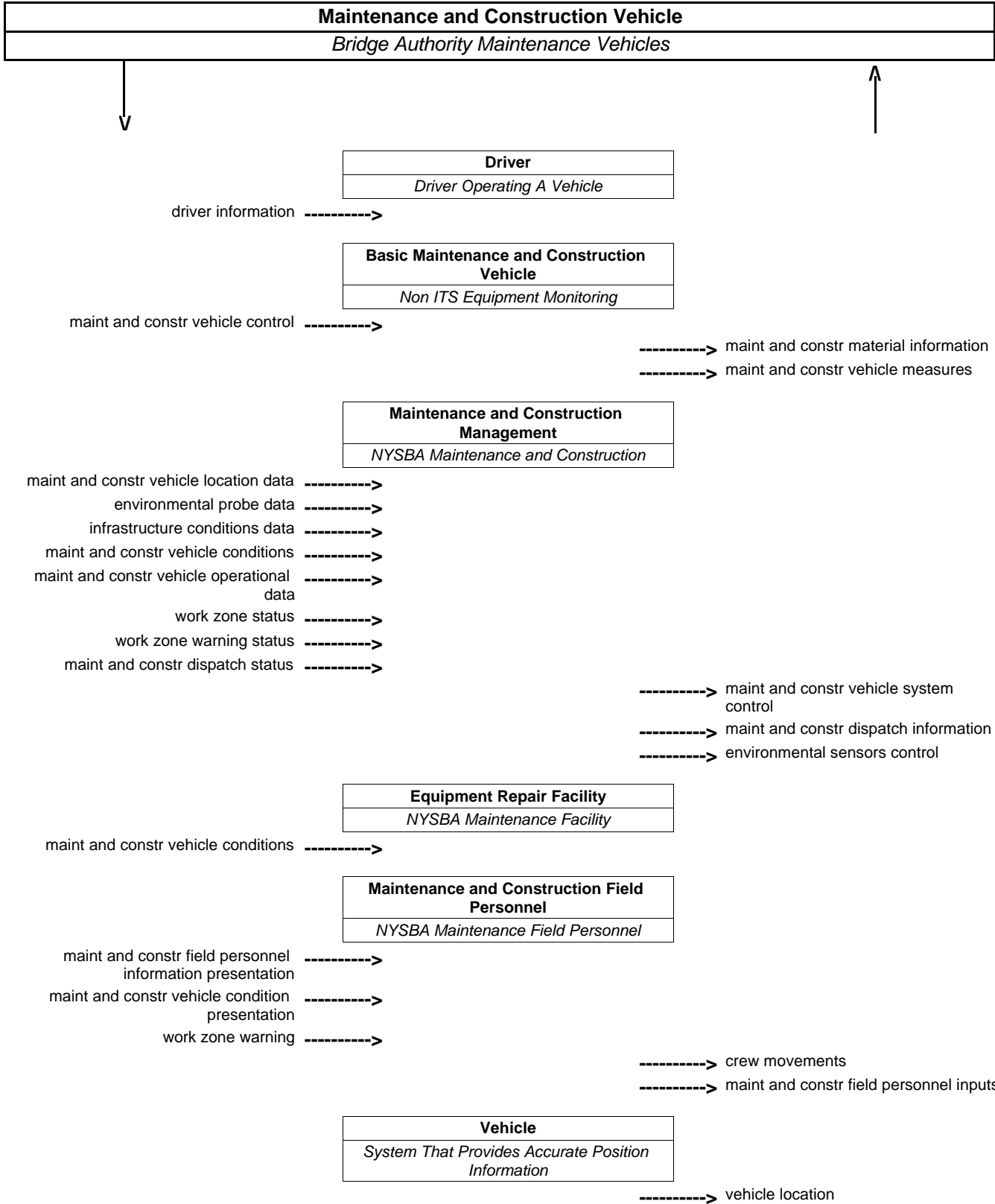




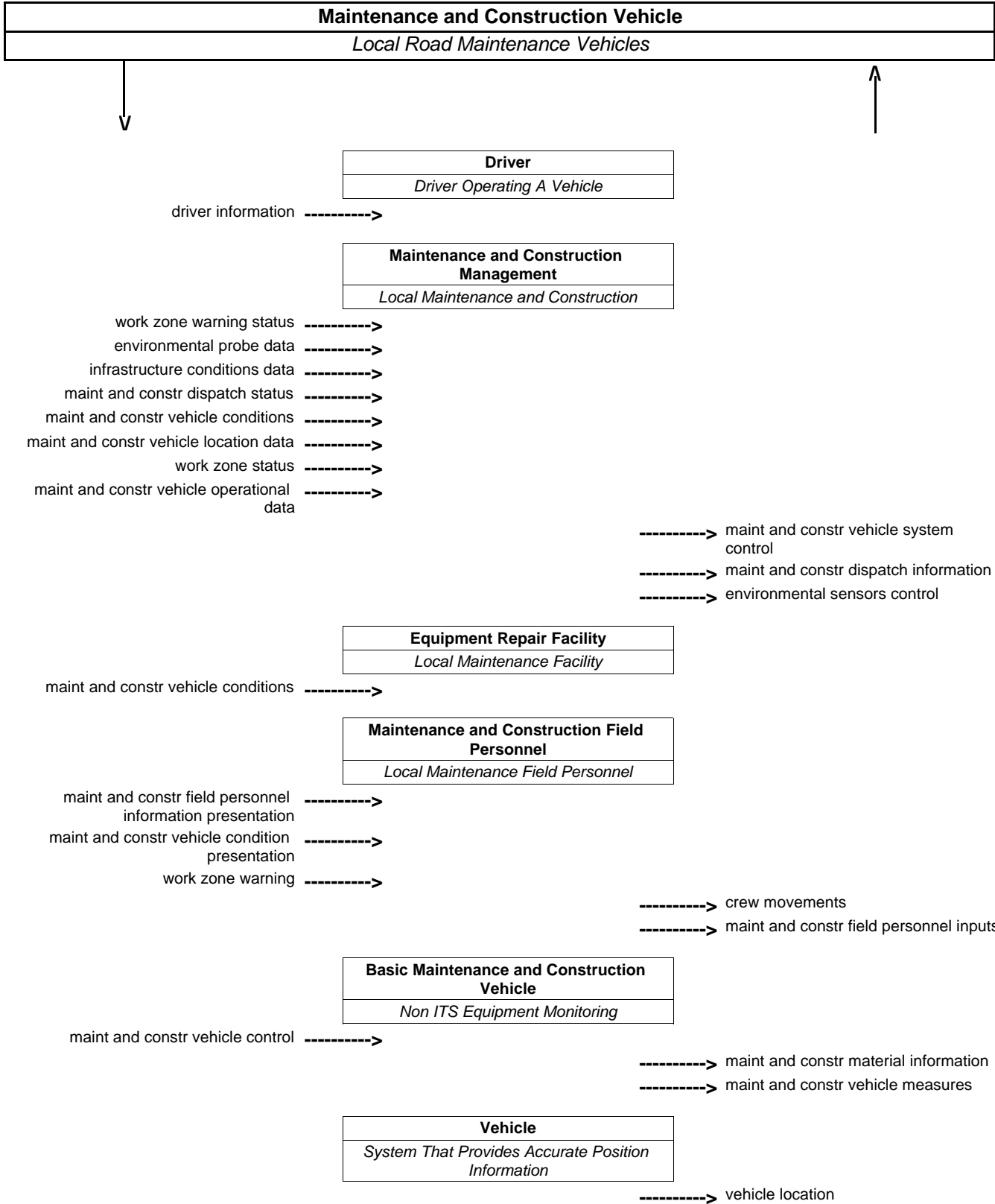












|   |
|---|
| <b>Maintenance and Construction Vehicle</b> |
| <i>NYSDOT Road Maintenance Vehicles</i>     |



|                                   |
|-----------------------------------|
| <b>Driver</b>                     |
| <i>Driver Operating A Vehicle</i> |

driver information ----->

|   |
|---|
| <b>Basic Maintenance and Construction Vehicle</b> |
| <i>Non ITS Equipment Monitoring</i>               |

maint and constr vehicle control ----->

-----> maint and constr material information  
 -----> maint and constr vehicle measures

|  |
|--|
| <b>Maintenance and Construction Management</b> |
| <i>NYSDOT Maintenance and Construction</i>     |

maint and constr vehicle location data ----->  
 environmental probe data ----->  
 infrastructure conditions data ----->  
 maint and constr vehicle conditions ----->  
 maint and constr vehicle operational data ----->  
 work zone status ----->  
 work zone warning status ----->  
 maint and constr dispatch status ----->

-----> maint and constr vehicle system control  
 -----> maint and constr dispatch information  
 -----> environmental sensors control

|                                    |
|------------------------------------|
| <b>Equipment Repair Facility</b>   |
| <i>NYSDOT Maintenance Facility</i> |

maint and constr vehicle conditions ----->

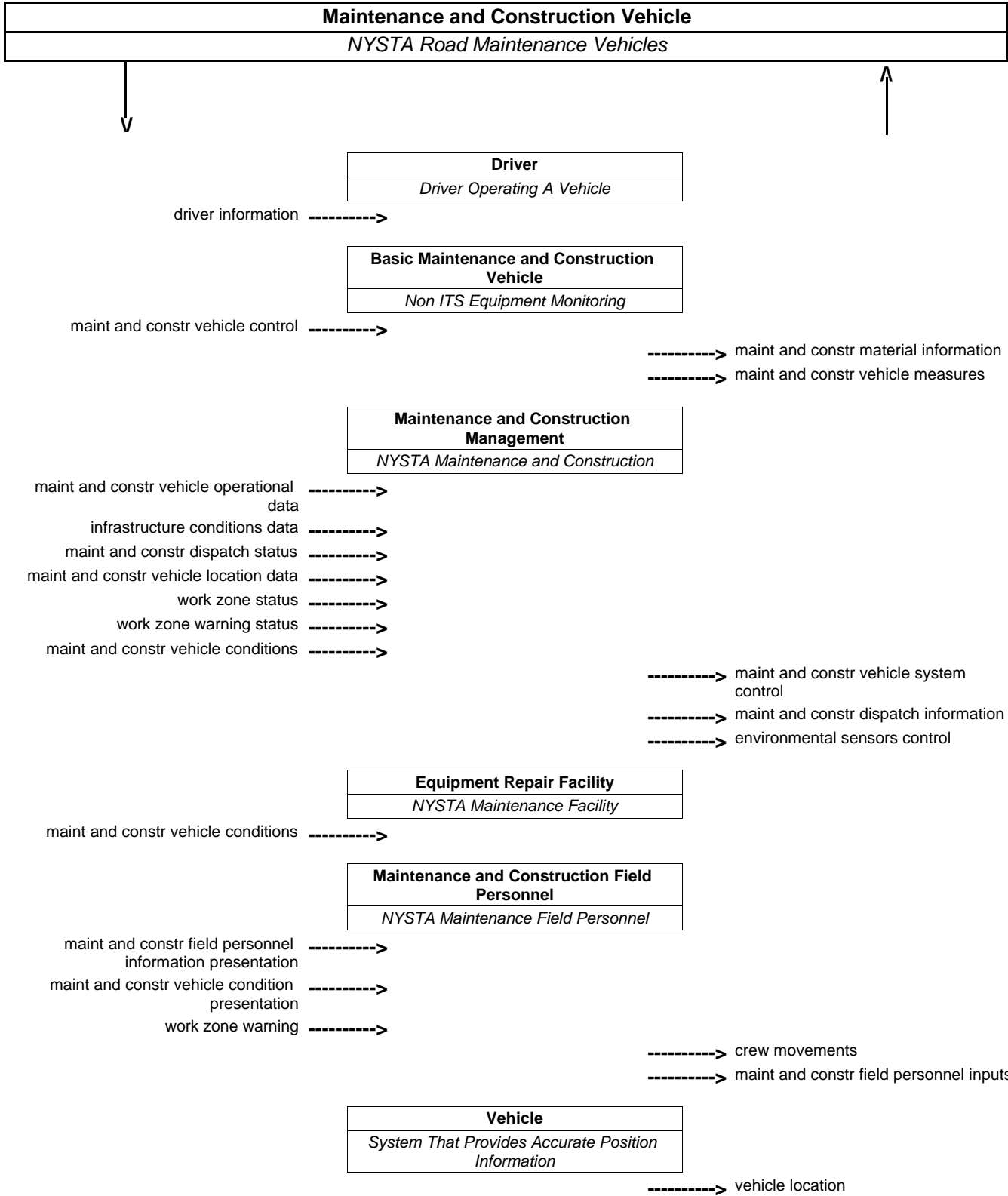
|   |
|---|
| <b>Maintenance and Construction Field Personnel</b> |
| <i>NYSDOT Maintenance Field Personnel</i>           |

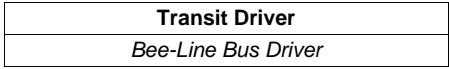
maint and constr field personnel information presentation ----->  
 maint and constr vehicle condition presentation ----->  
 work zone warning ----->

-----> crew movements  
 -----> maint and constr field personnel inputs

|   |
|---|
| <b>Vehicle</b>  |
| <i>System That Provides Accurate Position Information</i> |

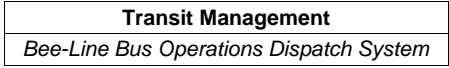
-----> vehicle location





transit driver display ----->

-----> transit driver inputs



transit vehicle location data ----->

transit vehicle conditions ----->

transit traveler request ----->

fare and payment status ----->

emergency notification ----->

-----> transit traveler information

-----> transit schedule information

-----> fare management information

-----> emergency acknowledge

-----> driver instructions

|   |
|---|
| <b>Transit Vehicle Subsystem</b><br><i>Bee-Line Bus Vehicles IT Equipment</i> |
|---|



|   |
|---|
| <b>Transit Driver</b><br><i>Bee-Line Bus Driver</i> |
|---|

transit driver display ----->

-----> transit driver inputs

|   |
|---|
| <b>Transit Management</b><br><i>Bee-Line Bus Operations Dispatch System</i> |
|---|

environmental probe data ----->

emergency notification ----->

fare and payment status ----->

request for bad tag list ----->

transit traveler request ----->

transit vehicle conditions ----->

transit vehicle location data ----->

transit vehicle passenger and use data ----->

transit vehicle schedule performance ----->

-----> transit schedule information

-----> request for vehicle measures

-----> fare management information

-----> emergency acknowledge

-----> driver instructions

-----> bad tag list

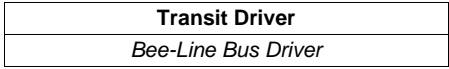
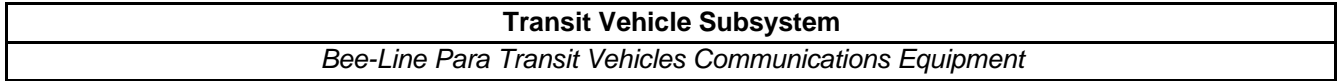
-----> transit traveler information

|   |
|---|
| <b>Vehicle</b><br><i>System That Provides Accurate Position Information</i> |
|---|

-----> vehicle location

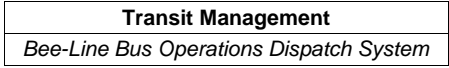
|  |
|--|
| <b>Basic Transit Vehicle</b><br><i>Transit fare Collection Equipment</i> |
|--|

-----> transit vehicle measures



transit driver display ----->

-----> transit driver inputs



transit vehicle location data ----->

transit vehicle conditions ----->

transit traveler request ----->

fare and payment status ----->

emergency notification ----->

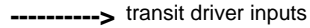
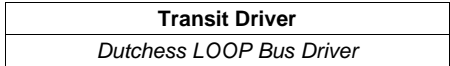
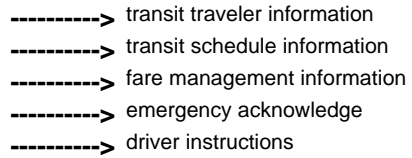
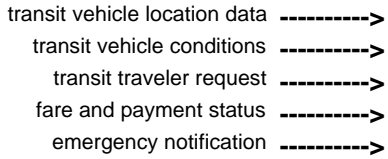
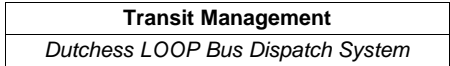
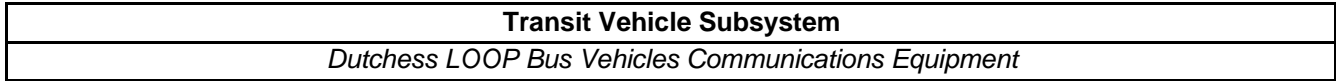
-----> transit traveler information

-----> transit schedule information

-----> fare management information

-----> emergency acknowledge

-----> driver instructions



|  |
|--|
| <b>Transit Vehicle Subsystem</b>               |
| <i>Dutchess LOOP Bus Vehicles IT Equipment</i> |



|  |
|--|
| <b>Transit Management</b>                |
| <i>Dutchess LOOP Bus Dispatch System</i> |

- request for bad tag list ----->
- emergency notification ----->
- fare and payment status ----->
- transit traveler request ----->
- transit vehicle conditions ----->
- transit vehicle location data ----->
- transit vehicle passenger and use data ----->
- transit vehicle schedule performance ----->
- environmental probe data ----->

- > bad tag list
- > transit traveler information
- > transit schedule information
- > request for vehicle measures
- > fare management information
- > emergency acknowledge
- > driver instructions

|                                 |
|---------------------------------|
| <b>Transit Driver</b>           |
| <i>Dutchess LOOP Bus Driver</i> |

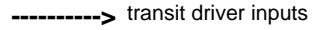
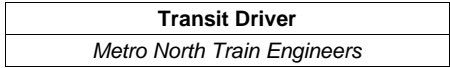
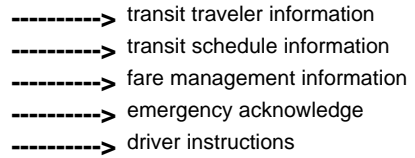
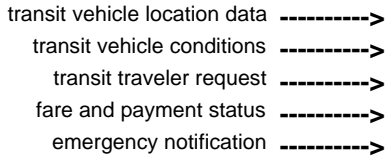
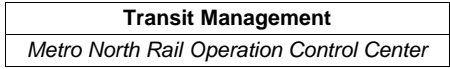
transit driver display ----->

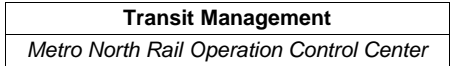
-----> transit driver inputs

|  |
|--|
| <b>Basic Transit Vehicle</b>             |
| <i>Transit fare Collection Equipment</i> |

-----> transit vehicle measures

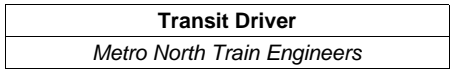






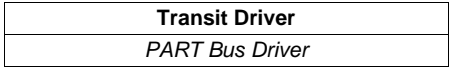
- request for bad tag list ----->
- fare and payment status ----->
- transit traveler request ----->
- transit vehicle conditions ----->
- transit vehicle location data ----->
- transit vehicle passenger and use data ----->
- transit vehicle schedule performance ----->
- emergency notification ----->

- > bad tag list
- > transit traveler information
- > transit schedule information
- > request for vehicle measures
- > fare management information
- > emergency acknowledge
- > driver instructions



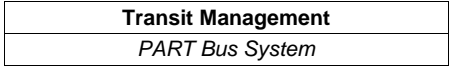
transit driver display ----->

-----> transit driver inputs



transit driver display ----->

-----> transit driver inputs



transit vehicle location data ----->

transit vehicle conditions ----->

transit traveler request ----->

fare and payment status ----->

emergency notification ----->

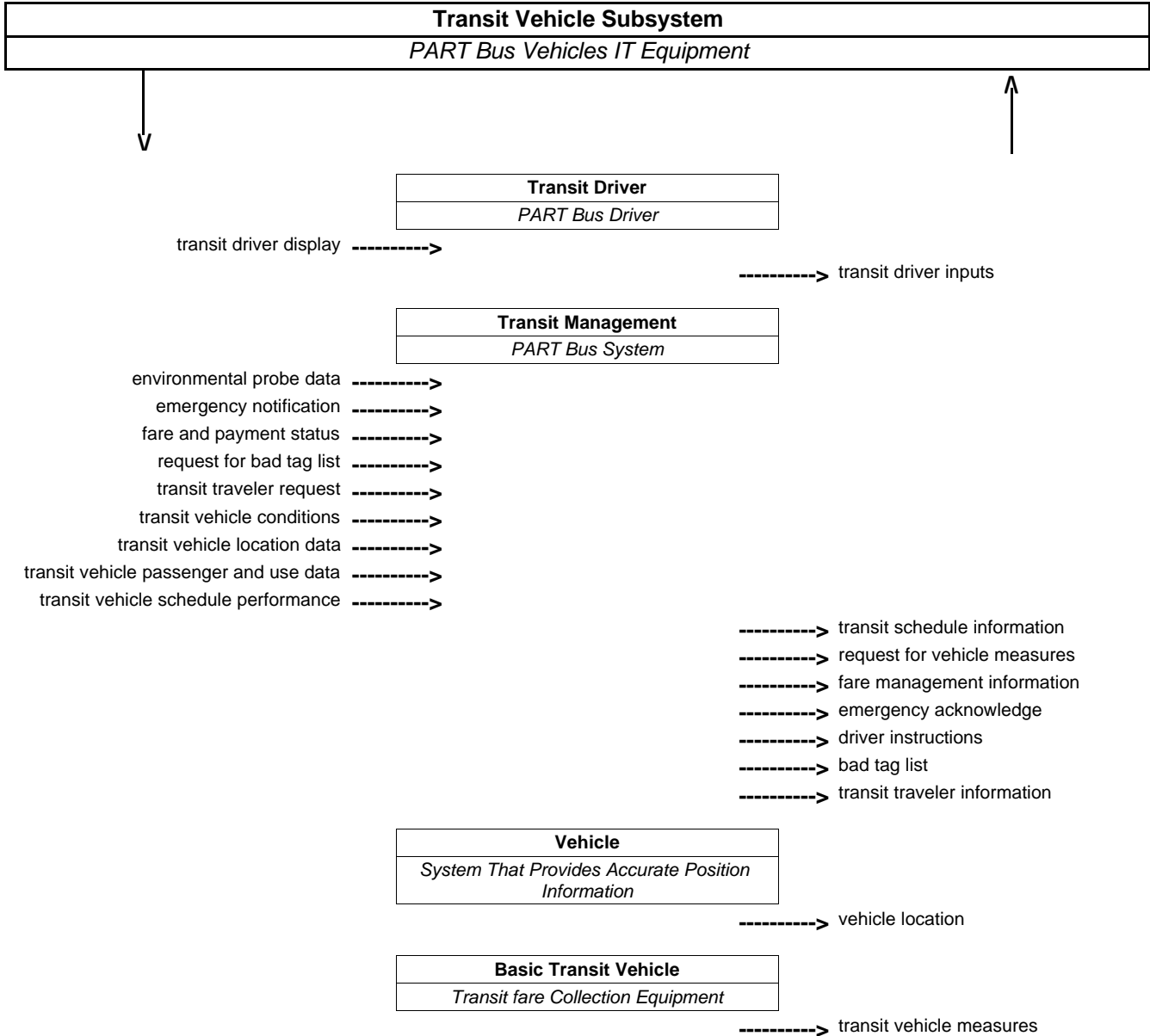
-----> transit traveler information

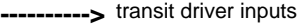
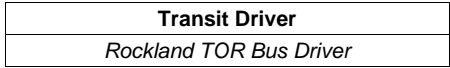
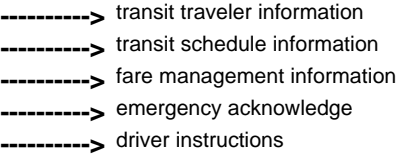
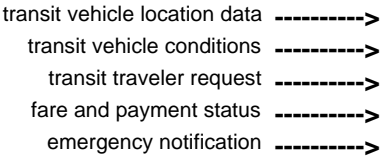
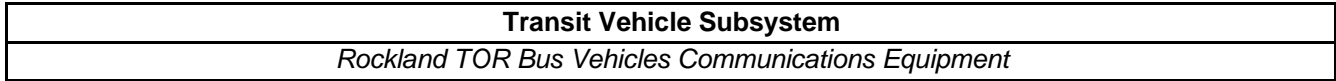
-----> transit schedule information

-----> fare management information

-----> emergency acknowledge

-----> driver instructions





|   |
|---|
| <b>Transit Vehicle Subsystem</b><br><i>Rockland TOR Bus Vehicles IT Equipment</i> |
|---|



|  |
|--|
| <b>Transit Management</b><br><i>Rockland TOR</i> |
|--|

- request for bad tag list ----->
- emergency notification ----->
- fare and payment status ----->
- transit traveler request ----->
- transit vehicle conditions ----->
- transit vehicle location data ----->
- transit vehicle passenger and use data ----->
- transit vehicle schedule performance ----->
- environmental probe data ----->

- > bad tag list
- > transit traveler information
- > transit schedule information
- > request for vehicle measures
- > fare management information
- > emergency acknowledge
- > driver instructions

|   |
|---|
| <b>Transit Driver</b><br><i>Rockland TOR Bus Driver</i> |
|---|

transit driver display ----->

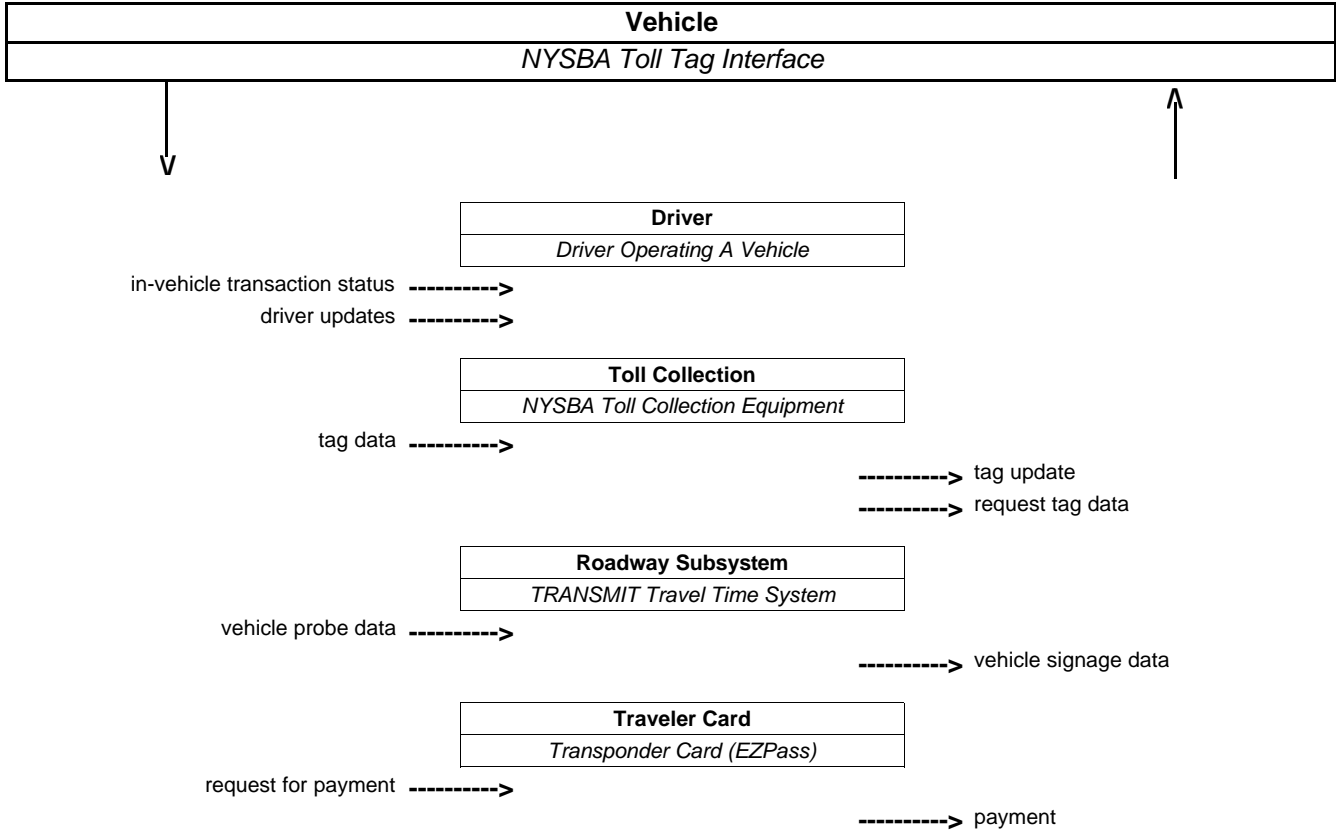
-----> transit driver inputs

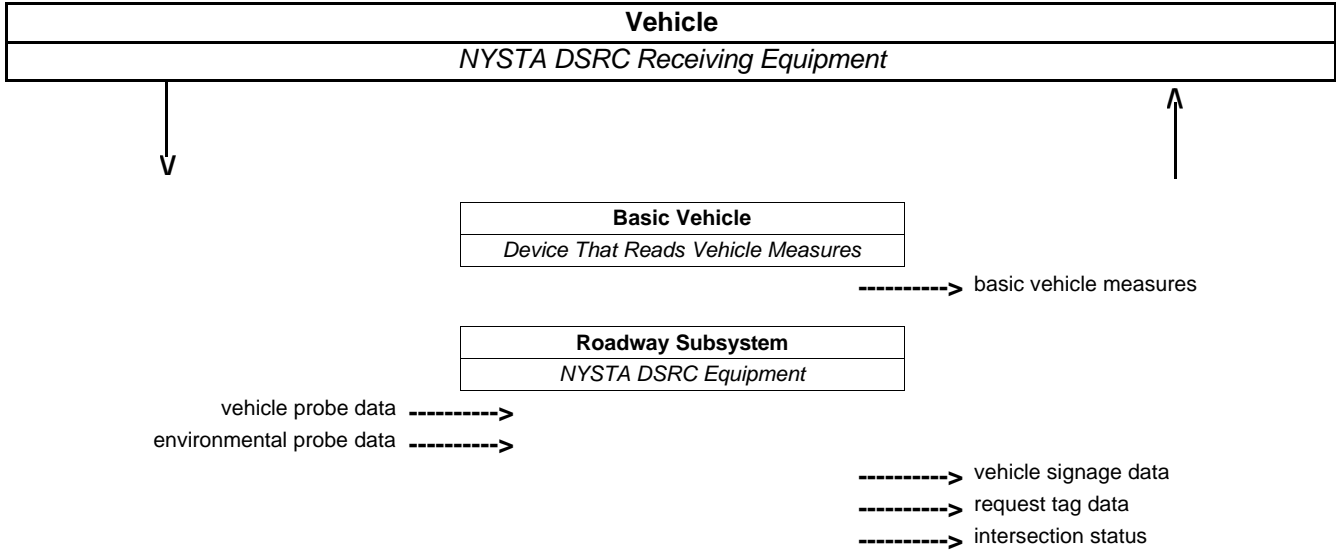
|   |
|---|
| <b>Vehicle</b><br><i>System That Provides Accurate Position Information</i> |
|---|

-----> vehicle location

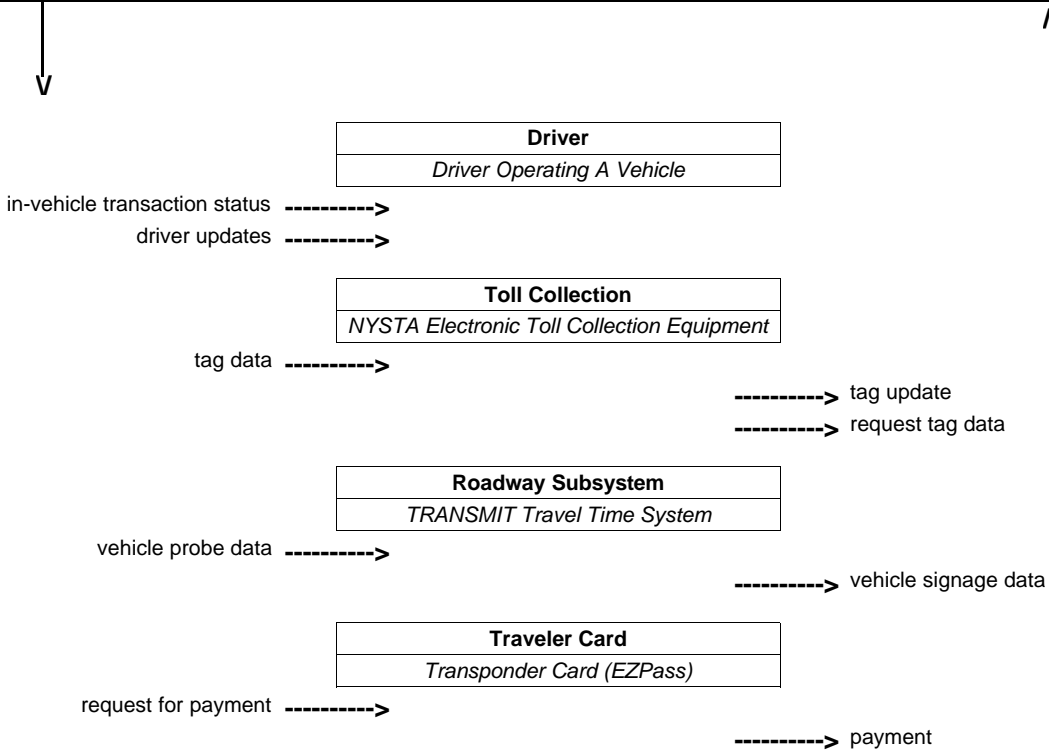
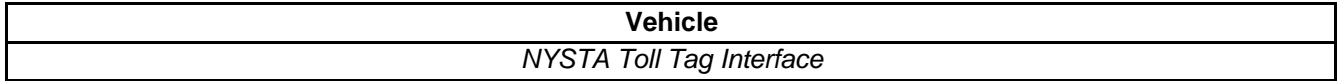
|  |
|--|
| <b>Basic Transit Vehicle</b><br><i>Transit fare Collection Equipment</i> |
|--|

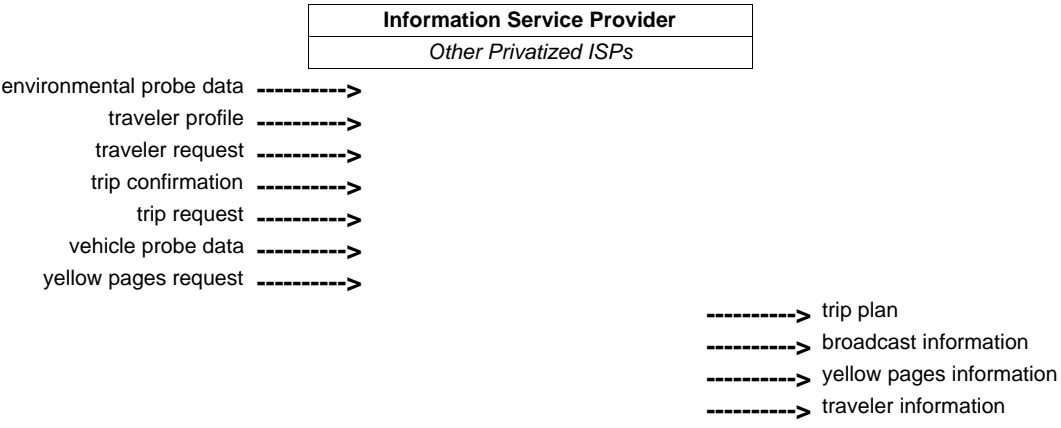
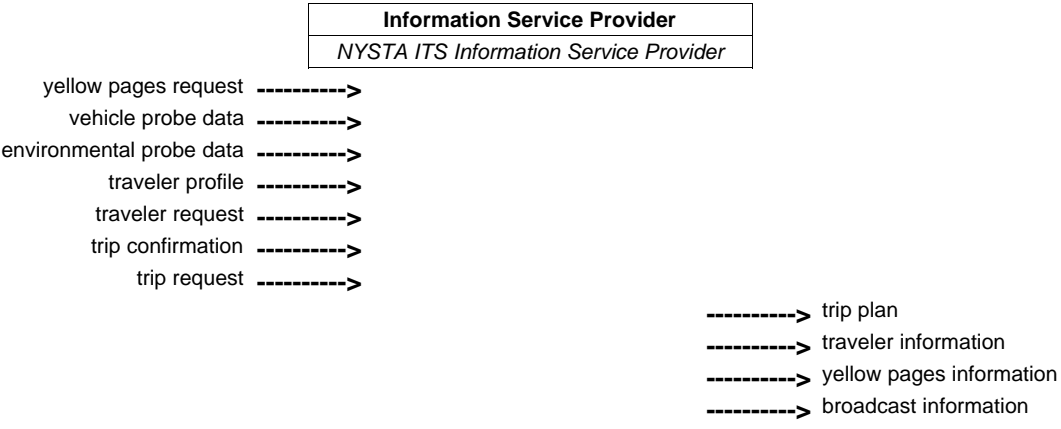
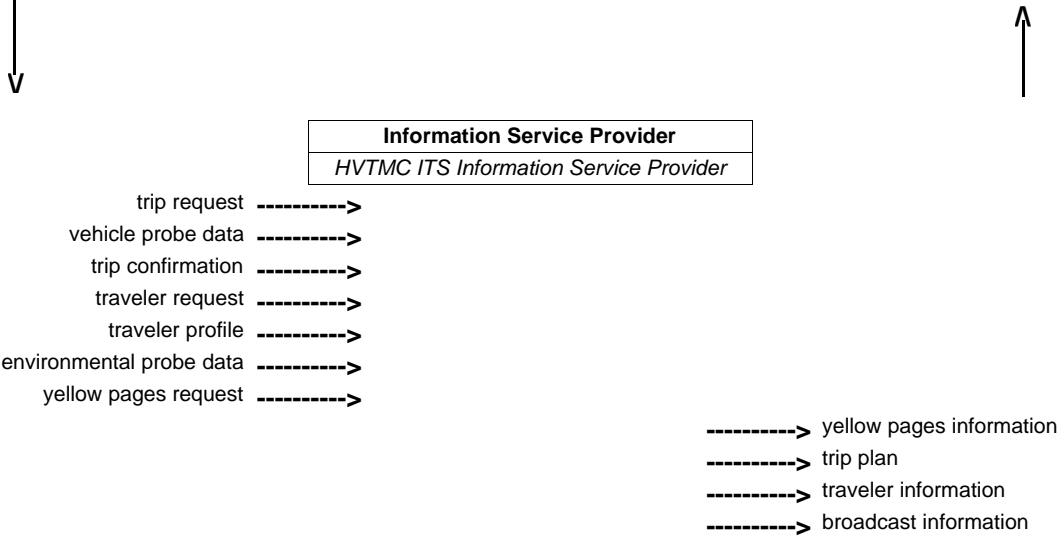
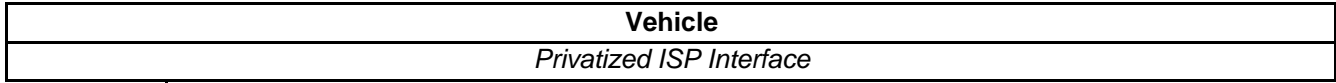
-----> transit vehicle measures

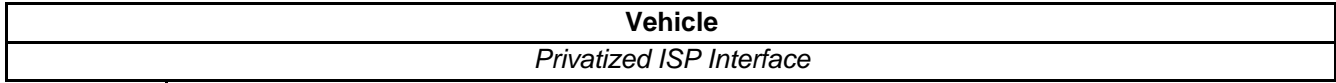




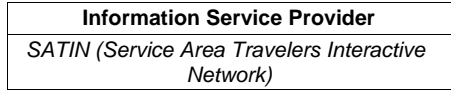






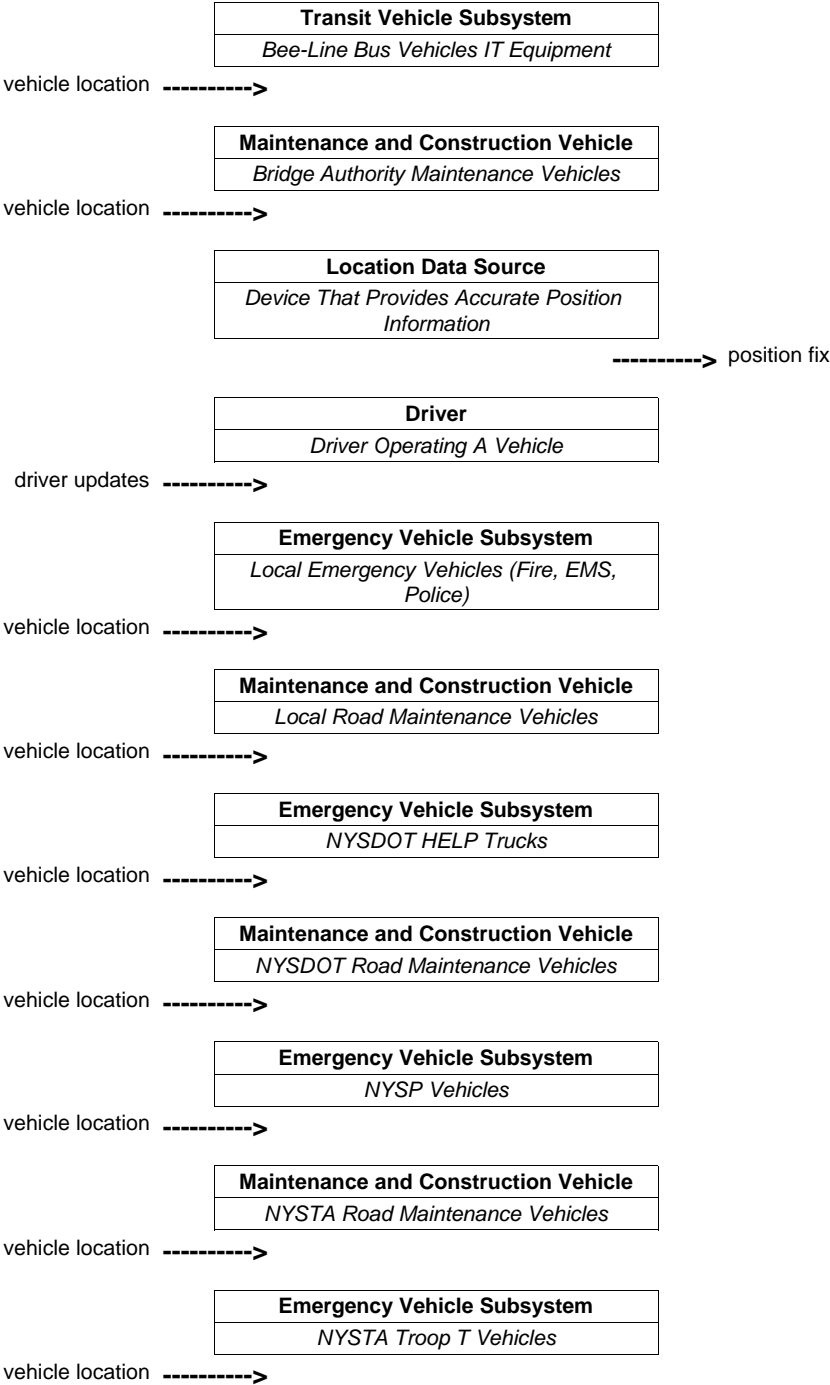
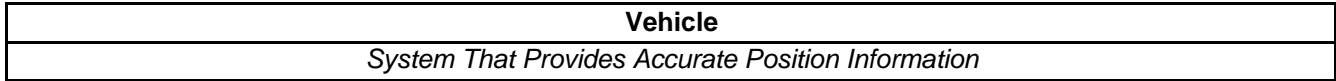


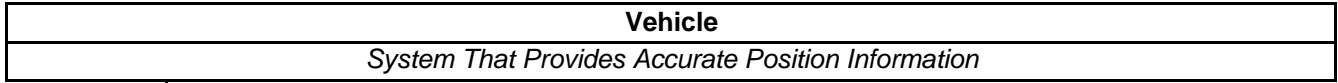
Continued...



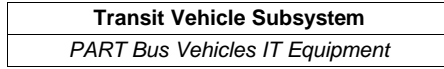
- yellow pages request ----->
- environmental probe data ----->
- traveler profile ----->
- traveler request ----->
- trip confirmation ----->
- trip request ----->
- vehicle probe data ----->

- > traveler information
- > trip plan
- > yellow pages information
- > broadcast information

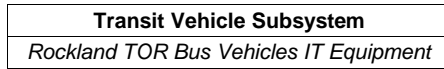




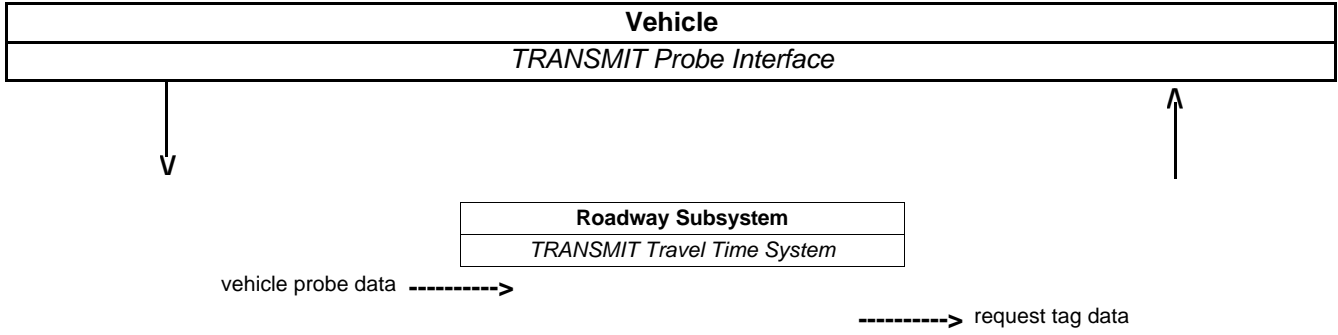
Continued...



vehicle location ----->



vehicle location ----->



**APPENDIX A**  
**RELEVANT PROCESS SPECIFICATION DEFINITIONS**

### **1.1.1.1 Process Traffic Sensor Data**

Overview: This process shall be responsible for collecting traffic sensor data. This data shall include traffic parameters such as speed, volume, and occupancy, as well as video images of the traffic. The process shall collect pedestrian images and pedestrian sensor data. The process shall collect multimodal crossing and high occupancy vehicle (HOV) lane sensor data. The process shall provide sensor status and fault indications. Where any of the data is provided in analog form, the process shall be responsible for converting it into digital form and calibrating. The converted data shall be sent to other processes for distribution, further analysis and storage.

Data Flows: All inputs are received as solicited inputs as a result of its regular scan of data input sources and all outputs are solicited.

Functional Requirements: This process shall :

- (a) continuously monitor the solicited data input flows shown above;
- (b) where necessary convert the data obtained in (a) from analog to digital form, and calibrate the data;
- (c) periodically send all of the surveillance data to other processes in the Manage Traffic function via the solicited output data flows shown above;
- (d) complete a full scan of all inputs and generate the outputs in less than the time interval between successive activations.

### **1.1.1.2 Collect and Process Sensor Fault Data**

Overview: This process shall be responsible for collecting sensor status, identifying faults, and logging faults that have been detected by processes in other parts of the Manage Traffic function. It shall be possible for the faults to have been detected locally at the sensors, or centrally through communications links with the sensors. The process shall pass on new fault data to another processes for communication to the Manage Maintenance and Construction function and shall receive fault clearances from the same function. It shall also maintain a store of the current fault state of all sensors. The process shall provide facilities that enable traffic operations personnel to review and update the current fault status of all sensors. Details of faulty and fixed equipment shall be passed by the process to the traffic control strategy selection process so that it can adjust its strategy to take account of the fault(s).

Data Flows: All input flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) the process shall be responsible for the maintenance of the store of the sensor fault data, using the appropriate mechanism(s) such as RDBMS, for storing the data.



### **1.1.1.3 Process Environmental Sensor Data**

Overview: This process shall be responsible for collecting and monitoring data obtained from environmental sensors. The process shall output sensor status and fault indications. The process shall receive sensor control data from other processes. Where any of the data is provided in analog form, the process shall be responsible for converting it into digital form and calibrating. The converted data shall be sent to other processes for distribution, further analysis and storage.

Data Flows: All inputs are unsolicited and all outputs are solicited.

Functional Requirements: This process shall :

- (a) continuously monitor the solicited data input flows shown above;
- (b) where necessary convert the data obtained in (a) from analog to digital form, and calibrate the data;
- (c) periodically send all of the surveillance data to other processes in the Manage Traffic function via the solicited output data flows shown above;
- (d) complete a full scan of all inputs and generate the outputs in less than the time interval between successive activations.

### **1.1.1.4 Manage Data Collection and Monitoring**

Overview: This process shall collect and monitor sensor data from the roadside. The process shall collect the sensor data including sensor status and sensor faults from roadside equipment and distribute it to the Manage Archive Data function. The process shall run when a request for data is received from an external source.

Data Flows: All input data flows are unsolicited with the exception of roadside\_archive\_data and all output flows which are solicited.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when any of the unsolicited inputs shown above are received, the process shall immediately generate the solicited output shown above;
- (c) data shall only be sent to the source from which the data request originated.

### **1.1.1.5 Provide Sensor Interface to Other Roadway Devices**

Overview:

This process shall provide the interface between roadway sensors and other roadway devices (considered to be contained in the Other Roadway terminator) for the exchange of data, status, and control. The other roadway devices can be adjacent geographically, under control of a different jurisdiction, or part of a more complex hierarchy. The data input to this process shall include sensor data from the sensors such as the following- traffic, environmental, and work zone intrusion detection. Additionally status and fault indications from the sensors shall be input to the process and passed along to the Other Roadway terminator. Control data shall come from the Other Roadway terminator into the process that shall output the control information to the correct sensor process. This process supports the collection of data locally on surface streets or freeways that might be needed to update nearby dynamic message signs with, for example, messages regarding road conditions or individual vehicle speed. This process and its companion process, Provide Device Interface to Other Roadway Devices, support autonomous traffic information dissemination without the need for direct control from a Manage Traffic function.

Data Flows: All input data flows are unsolicited inputs and all output data flows are solicited outputs.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) where necessary convert the data obtained in (a) from analog to digital form, and calibrate the data;
- (c) periodically send all of the surveillance data to other processes in the Manage Traffic function via the solicited output data flows shown above;
- (d) complete a full scan of all inputs and generate the outputs in less than the time interval between successive activations.

### **1.1.1.6 Collect Infrastructure Sensor Data**

Overview: This process shall use roadside sensors to monitor the condition of pavement, bridges, tunnels, culverts, signs, and other transportation-related infrastructure and report the results to the center and vehicle in the Manage Maintenance and Construction function. This process shall also receive sensor control data from both the center and vehicle. Infrastructure sensor equipment fault status and configuration data shall be generated by this process and returned to another process for inventory update and repair if deemed necessary.

Functional Requirements: None.

### **1.1.2.1 Process Traffic Data for Storage**

Overview: This process shall receive data from other processes and store the data into the long term and current data stores. The data shall comprise sensor data, both smoothed and unsmoothed: processed sensor surveillance data, data sent to control indicators (output devices e.g. intersection controllers, pedestrian controllers, ramp metering equipment), parking lot management data and other street equipment, the status data received from the indicators, plus current traffic conditions, planned events, current incidents, parking lot states, freeway ramp states, link travel times, roadway conditions provided by vehicle probes, and selected traffic control strategy. The data stored by the process in the current data store shall be the values collected over a relatively short period of time. The data stored in the long term data store shall be retained for a longer period. The data retained in the long term data store may be aggregated so as to reduce the storage requirements for long historical records, the amount of aggregation to be an implementation decision.

Data Flows: All input flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall :

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) maintain the store of current data in such a way that it contains data obtained over a limited time window, so that it presents a rolling picture of the current status and traffic conditions in the network, which is continually updated in real time;
- (c) maintain the store of long term data in such a way that it contains the data from the current data store (optionally aggregated) to provide a complete historical record of the state of the system over a longer time window;
- (d) the process shall be responsible for the maintenance of both current and long term data stores.

### **1.1.2.2 Process Traffic Data**

Overview: This process shall receive and process data from sensors (both traffic and environmental) at the roadway. The process distributes data to Provide Device Control processes that are responsible for freeway, highway rail intersections, parking lot, and surface street management. It also sends the data to another Provide Traffic Surveillance process for loading into the stores of current and long term data. This process distributes environmental sensor data to other processes in Manage Traffic as well as the process that is responsible for monitoring vehicle speed. Information about the various sensors to aid in this processing and distribution of data is accessed from the data store `static_data_for_sensor_processing`.

Data Flows: All inputs are unsolicited except for `static_data_for_sensor_processing` which is received as a result of requests for data retrieval. All outputs are solicited.

Functional Requirements: This process shall :

- (a) run whenever any of the unsolicited input data flows listed above are received;
- (b) use the data store '`static_data_for_sensor_processing`' to analyze sensor data and determine how to allocate the received data to the various solicited output flows shown in (a) through (g) above, and send them to the appropriate processes in the Provide Device Control facility;
- (c) analyze the input data to detect congestion and to pass this through the solicited output flow '`unusual_data`' to the Manage Incidents facility;
- (d) read data from the static data store '`static_data_for_sensor_processing`'.

### **1.1.2.3 Update Data Source Static Data**

Overview: This process shall be responsible for the maintenance of the store of static data used in the processing of sensor data. This sensor data shall be used to provide traffic surveillance information for use by other processes within the Manage Traffic function. The store shall contain data showing the relationship between sensors and the freeways, surface street and rural roadways, i.e. where they are located, to which part(s) of the network their data applies, the type of data, etc. It shall also hold information about the ownership of each link (that is, the agency or entity responsible for collecting and storing surveillance of the link) in the network which shall be used by processes involved in exchanging surveillance information (and optionally control) with other Manage Traffic functions.

Data Flows: All inputs are unsolicited and all outputs are solicited.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) on receipt of 'link\_data\_update' or 'new\_sensor\_static\_data' the process shall update the store of static data using the 'static\_data\_for\_sensor\_processing' flow.
- (c) on receipt of 'request\_sensor\_static\_data', the process shall send the contents of the 'static\_data\_for\_sensor\_processing' store on the 'existing\_sensor\_static\_data' flow.

### 1.1.2.5 Process Probe Data

Overview: This process shall be responsible for processing traffic probe data. This process shall calculate vehicle speed per network link based upon the probe data input. The probe data could be obtained from a fleet of vehicles that are using an automated vehicle location function to track the location of the vehicles (e.g. a transit fleet or emergency services fleet). The probe data could also be obtained from a process that directly measures the presence of vehicles at locations along the network allowing computation of the vehicle speed (e.g. using a vehicle tag and roadside reader) Finally, the probe data could be obtained from an analysis of toll transaction records. Based upon probe data inputs received, this process shall calculate the travel time for the links for which probe data has been provided. In the case of direct measurement of vehicle location (e.g. the tag and reader approach) this shall be achieved by noting the successive times at which the tag data is received and calculating the travel time from the difference. The data obtained from the toll tag transaction record analysis and/or direct measurement (e.g. the tag reader approach) will not need any further processing as it will contain the average travel times between successive toll collection plazas or direct measurement locations. The process shall maintain a data store that contains the average travel time for each link in the freeways, surface streets, and rural roadways that is calculated from one of the above forms of probe data. Calculation of the actual average values shall employ some type of aggregation processing (e.g., smoothing or similar technique) and be stored for differing time categories (e.g., times of day, day of week, holidays) in periodic increments. The current delay time for a link shall be the difference between current travel time value and the aggregate processed (e.g., average) value for that time category.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'probe\_data\_for\_traffic';
- (b) 'vehicle\_tag\_data';
- (c) 'transit\_probe\_data'.

Solicited Input Processing: This process shall receive the following data flows as a result of requests for data retrieval:

- (a) 'static\_data\_for\_sensor\_processing' - which contains data about links and tag reading points (the request is implicit in accessing data from this local data store).

Solicited Output Processing: This process shall provide the following output flows as a result of the above input being received:

- (a) 'link\_data\_from\_tags';
- (b) 'link\_data\_from\_avl'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited data flows shown above;
- (b) when the 'vehicle\_tag\_data' flow is received, store the tag data and check for any previous receipt from the same tag. Read the tag data from the store (location ID, tag ID and a time stamp) received from reading tags at locations that have not been correlated with a subsequent tag measurement;
- (c) if any previous occurrences of a particular tag data are found, compute the link travel time;
- (d) Assess if the value in (c) is realistic, i.e., it shall not be unduly long (an 'outlier') due to the vehicle being parked somewhere for a period of time. For example, this assessment could be made by comparing the travel time with the travel time value for the time of day already held in the data store or with other recently received data for the same link (also known as 'outlier analysis');
- (e) if the new value is not assessed to be an outlier, then use it to update the aggregate (e.g., average) link travel time for the current time category and update the data store;
- (f) if the new value shows a significant difference from the stored value (and is not assessed to be an outlier) then update an estimate of the link delay time;
- (g) following completion of (e) or (f), generate the output of link travel and delay times, setting

the values for any links where there is no travel time data to zero (0) to indicate 'no or uncertain data';  
(h) the process shall be responsible for the maintenance of the store of link calculation data;  
(i) the process shall read data from the store of static data in support of its analysis.

#### **1.1.2.7 Monitor Reversible Lanes**

Overview: This process shall be responsible for monitoring the use of reversible lanes and detecting wrong-way vehicles in reversible lanes. The process shall monitor sensor data and video images from the reversible lanes, and use this information along with the lane status (which direction it is currently operating) to identify when a vehicle is traveling in the wrong direction on the reversible lane.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'static\_data\_for\_sensor\_processing';  
(b) 'incident\_video\_images'.

Solicited Input Processing: This process shall receive the following data flows as a result of requests for data retrieval (the requests are implicit in the connection to a local database):  
(a) 'sensor\_data\_for\_reversible\_lanes'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'wrong\_way\_vehicle\_detection'.

Functional Requirements: This process shall:  
(a) continuously monitor for receipt of the unsolicited input flows listed above;  
(b) process traffic sensor data to determine both the number of vehicles detected in reversible lane(s) and the identity of vehicle(s) using the lane(s);  
(c) vehicle identities shall not be passed to the data storage process and shall be sent to the traffic operations personnel and the Manage Emergency Services function in the event of an unvalidated and unverified violation being detected (law enforcement shall be responsible for validating and verifying these detected events).

### 1.1.3 Generate Predictive Traffic Model

Overview: This process shall be responsible for continually producing and updating a predictive model of the traffic flow conditions in the road or freeway network served by the Manage Traffic function that an instance of this process is allocated to. The prediction shall be based on current surveillance, historic traffic data and surveillance, current incidents, planned events, current traffic control strategy, data received from other Manage Traffic functions serving other geographic and/or jurisdictional areas, and current and predicted weather conditions. The predictive model of traffic flow produced by this process shall be used by processes in the Manage Traffic function and other ITS functions.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'current\_incident\_data';
- (b) 'fws-predicted\_weather';
- (c) 'planned\_events';
- (d) 'selected\_strategy';
- (e) 'transit\_request\_for\_prediction\_data'.

Solicited Input Processing: This process shall receive the following data flows as a result of requests for data retrieval from local data stores:

- (a) 'historical\_data';
- (b) 'other\_traffic\_center\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'prediction\_data';
- (b) 'predictive\_model\_data';
- (c) 'unusual\_congestion'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above storing the received data internally to the process;
- (b) periodically or continuously produce an updated predictive estimate of the traffic flow conditions within the road network served by the specific instance of the Manage Traffic function, identifying any segments on which unusual congestion will form;
- (c) the process shall be responsible for the maintenance of the store of predictive data.

#### **1.1.4.1 Retrieve Traffic Data**

Overview: This process shall distribute traffic data and environmental sensor data to other functions within ITS and to other terminators on the boundary of the architecture. The process shall retrieve data from the data stores managed by other processes in the Provide Traffic Surveillance facility of the Manage Traffic function. The process shall respond to requests for data that originate from traffic operations personnel, the media, the Manage Transit function, the Manage Emergency Services function, the Manage Demand facility within the Manage Traffic function, and the Provide Driver and Traveler Services function. The process shall provide environmental sensor data to the Manage Maintenance and Construction function as well as the Weather Service and Surface Transportation Weather Service terminators. The process shall also generate traffic data for output by other processes to in-vehicle signage functions.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'request\_traffic\_operations\_data';
- (b) 'traffic\_data\_distribution\_request';
- (c) 'traffic\_data\_demand\_request';
- (d) 'request\_traffic\_media\_data';
- (e) 'traffic\_data\_for\_deployment'
- (f) 'transit\_request\_for\_traffic\_info'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval:

- (a) 'current\_data';
- (b) 'long\_term\_data';
- (c) 'predictive\_model\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'retrieved\_traffic\_operations\_data';
- (b) 'traffic\_data\_for\_demand';
- (c) 'traffic\_data\_for\_distribution';
- (d) 'traffic\_data\_for\_signage';
- (e) 'traffic\_data\_for\_transit';
- (f) 'retrieved\_traffic\_media\_data';
- (g) 'operator\_log\_for\_traffic\_data';
- (h) 'traffic\_data\_deployment\_request'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input data flows listed above;
- (b) when any of the flows in (a) are received, retrieve data from the current, long term and predictive model data stores, using the solicited input data flows listed above;
- (c) generate and issue the solicited output flow listed above that corresponds to the input flow, loading into it the data appropriate to the recipient;
- (d) periodically or on an event driven basis generate the data flow sent to the traffic control process responsible for sending data to processes that broadcast to in-vehicle signage equipment;
- (e) periodically or on an event driven basis generate the environmental data flows sent to the Weather Service, the Surface Transportation Weather Service, and the Manage Maintenance and Construction function;
- (f) periodically or on an event driven basis generate the traffic data and incident image data flows provided to the Manage Emergency Services function;
- (g) the process shall retrieve data from the stores of current, long term and predictive data as needed to support its other processing requirements.



### **1.1.4.2 Provide Traffic Operations Personnel Traffic Data Interface**

Overview: This process shall provide the interface through which traffic operations personnel can obtain access traffic data, traffic video images, and weather information. The personnel can access data stored by other processes in the Provide Traffic Surveillance facility of the Manage Traffic function. The personnel can set up the parameters that govern the data that is available to non-traffic operations people via a separate process to the media. This stored data shall comprise current and long term (historic) data on traffic conditions, weather conditions and roadside equipment activity, plus prediction estimates of traffic conditions. The data shall apply to some or all of the freeways, surface street, and rural roadways served by the specific instance of the Manage Traffic function. Where appropriate and/or requested by the traffic operations personnel, the process shall provide the data output in the form of an overlay onto a map of the relevant part(s) of the freeways, surface street and rural roadways served by the instance of the function. The process shall obtain the map from a local data store, which it shall enable the traffic operations personnel to update as and when required.

Data Flows: All inputs are unsolicited except for retrieved\_traffic\_operations\_data which, along with all outputs, is solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor the input data flows and provide acknowledgment of receipt through a human interface of those from traffic operations personnel;
- (b) be capable of carrying out its own verification of input data received from traffic operations personnel and generating the correct solicited output data flow as a result of input data being received;
- (c) as part of the output generation process, carrying out checks for data out of range, missing or containing spurious values and requesting re-input where required;
- (d) be capable of simultaneously handling multiple independent input/output data channels, i.e. supporting access by more than one traffic operations personnel;
- (e) providing all output to traffic operations personnel in a form that is readily understood by a human operator;
- (f) only generate the outputs listed above as a result of receiving inputs from the traffic operations personnel or other processes;

### **1.1.4.3 Provide Direct Media Traffic Data Interface**

Overview: This process shall be responsible for providing the interface between the media and the process responsible for obtaining data from the stores of traffic data maintained by other processes within the Provide Traffic Surveillance facility of the Manage Traffic function. The process shall enable the media to request and be provided with current, long term (historic) and predicted traffic data. The data may be provided in one or more formats: as a data stream, as processed and displayed to Traffic Operations Personnel (e.g. graphical summaries of link speeds), or as a display (with data included on a map of relevant part(s) of the road and freeway served by the Manage Traffic function. The media shall only be able to request and see displayed that data that the traffic operations personnel have made available, through the use of the definition in the traffic data media parameters.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'fm-traffic\_data\_request'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval from local data stores:  
(a) 'map\_data\_for\_traffic\_display';  
(b) 'retrieved\_traffic\_media\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'request\_traffic\_media\_data';  
(b) 'tm-traffic\_data'.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor the input data flows and provide acknowledgment of receipt of those from the media;  
(b) be capable of accepting input from the media in audio or other forms, where the latter may comprise input from any combination of keyboards or other forms of push-button devices, pointing devices, etc.;  
(c) be capable of carrying out its own verification of input data received from the media and generating the correct solicited output data flow as a result of input being received;  
(d) as part of the output generation process, carrying out checks for data out of range, missing or spurious values and requesting re-input where necessary;  
(e) be capable of simultaneously handling a large number of independent input/output data channels, i.e. supporting very many media, some of whom may be remote;  
(f) providing all output to the media in a form that is readily understood by a human operator and which may be in audio or visual form, with the latter being available in a variety of formats, e.g. displays, or hardcopy (paper) output;  
(g) only generate the outputs listed above as a result of receiving inputs from the media or the other processes;  
(h) the use of the digitized map display shall be automatic and shall be at a resolution best suited to the quantity and scope of data being displayed, i.e. the map shall be to the largest possible scale.

#### **1.1.4.4 Update Traffic Display Map Data**

Overview: This process shall provide updates to a store of digitized map data when a request is received from traffic operations personnel via their interface process. The map data shall be for use as the background for displays of traffic data requested by traffic operations personnel and the media through their respective interface processes. This process shall obtain the new map data from either a specialized data supplier or some other appropriate data source.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flow:  
(a) 'request\_traffic\_map\_display\_update'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to external functions:  
(a) 'fmup-traffic\_display\_update'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'tmup-request\_traffic\_display\_update';  
(b) 'map\_data\_for\_traffic\_display'.

Functional Requirements: This process shall:  
(a) continuously monitor for the receipt of the unsolicited data flow shown above;  
(b) when the data flow 'request\_traffic\_map\_display\_update' is received, generate the 'tmup-request\_traffic\_display\_update' output data flow and continuously monitor for receipt of the solicited input data flow 'fmup-traffic\_display\_update';  
(c) when the flow 'fmup-traffic\_display\_update' is received, prepare and output the 'map\_data\_for\_traffic\_display' data flow;

#### **1.1.4.5 Provide Media System Traffic Data Interface**

Overview: This process shall provide the interface through which traffic and incident data can be output to the Media. The output shall comprise traffic and incident data that is suitable for output to the Media System as determined by traffic managers. This interface is only for the output of data that has been requested by the Media.

Data Flows: All inputs are unsolicited and all outputs are solicited.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor for receipt of the 'information\_for\_media' data flow;  
(b) when received convert information\_for\_media into a form for output to the media.

#### **1.1.4.6 Provide Traffic Data Retrieval Interface**

Overview: This process shall provide customized sets of traffic data for broadcast, advisories, and personalized data to travelers, traveler information data archive, commercial vehicle fleets, and the media. This process shall also provide to travelers maintenance and construction data, including scheduled maintenance and construction work activities and work zone activities. This process shall use the parameters in the data store 'traffic\_data\_retrieval\_parameters' to define exactly what data shall be retrieved as a result of each request. The process shall select the appropriate subset of traffic data or maintenance and construction data which will be sent to each ITS function that is requesting data. The process shall accept traveler profiles for use in determining what personalized data to send to the traveler. The process shall send kiosk and personal traffic requests to the archival process.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'incident\_details\_from\_media';
- (b) 'traffic\_data\_advisory\_request';
- (c) 'traffic\_data\_guidance\_request';
- (d) 'traffic\_data\_personal\_request';
- (e) 'traffic\_data\_kiosk\_request';
- (f) 'traffic\_data\_portables\_request';
- (g) 'traffic\_data\_ridesharing\_request';
- (h) 'traveler\_traffic\_profile';
- (i) 'current\_traffic\_pollution\_data'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval:

- (a) 'traffic\_data\_retrieval\_parameters';
- (b) 'traffic\_data\_for\_distribution';
- (c) 'sensor\_data\_for\_distribution'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'information\_for\_media';
- (b) 'traffic\_data\_distribution\_request';
- (c) 'traffic\_data\_for\_advisory\_output';
- (d) 'traffic\_data\_for\_guidance';
- (e) 'traffic\_data\_for\_kiosks';
- (f) 'traffic\_data\_for\_portables';
- (g) 'traffic\_data\_for\_ridesharing';
- (h) 'traffic\_data\_personal\_request\_for\_archive';
- (i) 'traffic\_data\_kiosk\_request\_for\_archive';
- (j) 'traffic\_data\_for\_broadcast\_to\_kiosks';
- (k) 'traffic\_data\_for\_broadcast\_to\_personal\_devices'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of any of the unsolicited input data flows listed above;
- (b) when the flow received in (a) is a request for data, send the request to the data retrieval process and data archival process using the request solicited output data flow shown above;
- (c) when the response to the request flow in (b) is received, assemble the data for output according to the data in the 'traffic\_data\_retrieval\_parameters' data store;
- (d) when (c) is complete, send the retrieved data to the requesting process in the corresponding solicited output flow shown above;
- (e) if the data flow in (a) contains new data for the store of traffic data retrieval parameters, load it into the 'traffic\_data\_retrieval\_parameters' data store.

#### **1.1.4.7 Manage Traffic Archive Data**

Overview: This process shall collect traffic data and AHS operational data to distribute to the Manage Archive Data function. The process shall run when a request for data is received from an external source, or when fresh data is received.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'archive\_traffic\_data\_for\_deployment';
- (b) 'traffic\_management\_archive\_request';
- (c) 'ahs\_operational\_data';
- (d) 'traffic\_data\_for\_deployment';
- (e) 'static\_data\_for\_archive';
- (f) 'ftop-archive\_command';
- (g) 'traffic\_management\_archive\_status'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval:

- (a) 'traffic\_data\_archive';
- (b) 'traffic\_management\_archive\_status'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'traffic\_management\_archive\_data';
- (b) 'traffic\_data\_deployment\_request';
- (c) 'ttop-archive\_status'.

Functional Requirements: none.

### 1.1.5 Exchange data with Other Traffic Centers

Overview: This process shall exchange data the Other TM terminator. This represents the exchange of data between peer Manage Traffic functions (e.g between peer Traffic Management Centers (TMC)). The other TMC can be adjacent geographically, under control of a different jurisdiction, or part of a more complex hierarchy. The exchange of data may be triggered by a request to (or from) the Other TM. or the exchange of data may be initiated without a specific request. This data shall include both traffic information and traffic control data. Some examples of these exchanges are: traffic control preemption for vehicle routes which pass through the local network but have a destination in an area served by another remote TMC; data about an incident that has an impact on the traffic conditions in the network served by a remote TMC; or control data for the Manage Traffic function to control video cameras under the jurisdiction another traffic management organization. The data received from remote TMCs could be used to vary the current traffic control strategy to give signal preemption to emergency vehicles or enable the passage of commercial vehicles with unusual loads, or as input to the local traffic predictive model estimation process.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'cv\_incidents\_for\_other\_TMC';
- (b) 'emergency\_data\_for\_other\_TMC';
- (c) 'fotc-data\_request';
- (d) 'fotc-identity';
- (e) 'fotc-transfer\_data';
- (f) 'request\_other\_TMC\_data';
- (g) 'request\_other\_current\_incidents\_data';
- (h) 'request\_other\_predicted\_incidents\_data'.

Solicited Input Processing: This process shall receive the following data flows as a result of requests for data retrieval from local data stores:

- (a) 'link\_details';
- (b) 'historical\_data';
- (c) 'current\_data'.

Solicited Input Processing: This process shall receive the following data flows as a result of requests for data retrieval from the other TM terminator:

- (a) 'fotc-identity';
- (b) 'fotc-transfer\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'other\_current\_incidents';
- (b) 'other\_planned\_events';
- (c) 'other\_TMC\_cv\_incidents';
- (d) 'other\_TMC\_emergency\_data';
- (e) 'other\_TMC\_strategy\_data';
- (f) 'other\_traffic\_center\_data';
- (g) 'request\_local\_current\_incidents\_data';
- (h) 'request\_local\_planned\_events\_data';
- (i) 'totc-data\_request';
- (j) 'totc-identity';
- (k) 'totc-transfer\_data'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when either 'cv\_incidents\_for\_other\_TMC' or 'emergency\_data\_for\_other\_TMC' unsolicited inputs are received, generate the 'totc-identity' and 'totc-transfer\_data' solicited output data flows (and issue them to the other TM terminator);
- (c) when the 'fotc-data\_request' and 'fotc-identity' unsolicited input data flows are received, and if requested in those data flows, read the data from the long term data store that is relevant to the requesting TMS, and generate the 'totc-identity' and 'totc-transfer\_data' solicited output data flows, (and issue them to the other TM terminator);
- (d) when the 'fotc-identity' and 'fotc-transfer\_data' unsolicited input data flows are received,

generate those of the 'other\_current\_incidents', 'other\_planned\_events', 'other\_TMC\_cv\_incidents' or 'other\_TMC\_emergency\_data' solicited output data flows for which data has been provided and send them to their receiving processes, or in the case of the 'other\_TMC\_emergency\_data' flow load the data into the store containing other traffic center data;

(e) when any of the 'request\_other\_TMC\_data', 'request\_other\_current\_incidents\_data' or 'request\_other\_planned\_events\_data' unsolicited input data flows is received, generate the 'totc-data\_request' and 'totc-identity' solicited output data flows and send them to the other TM terminator;

(f) the process shall be responsible for the maintenance of the store of data from other TMC's for use by the predictive modeling process.

### **1.1.6 Collect Vehicle Probe Data**

Overview: This process shall collect vehicle probe data at the roadside. This process shall support the ability to measure a characteristic of the vehicle that can be used to uniquely identify it at multiple locations at the roadside, and from which link time calculations can be determined. An example of this type of system is reading of toll and parking tags on passing vehicles. In these systems the tag ID is read but translated by the process into a unique but anonymous ID that does not store or transmit the identity of the tag in any way that is traceable to the tag owner, e.g. credit identity or stored credit value. This ID is then passed on to another process for further link travel time calculation analysis.

Unsolicited Output Processing: This process shall provide the following output flows regardless of whether or not it has received any input flows:

- (a) 'parking\_lot\_tag\_data\_needed';
- (b) 'toll\_tag\_data\_needed'.

Solicited Input Processing: This process shall receive the following data flows as a result of data being sent to other processes:

- (a) 'parking\_lot\_tag\_data\_input';
- (b) 'toll\_tag\_data\_input'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'vehicle\_tag\_data'.

Functional Requirements: This process shall:

- (a) continuously output the unsolicited output flows list above;
- (b) when either of the solicited input flows shown above are received, convert the tag data into a form which is unique and protects the identity of the traveler;
- (c) output the data obtained in (b) to the analysis process in the 'vehicle\_tag\_data' data flow.

### 1.2.1 Select Strategy

Overview: This process shall select the appropriate traffic control strategy to be implemented over a road and/or freeway section served by the specific instance of the Manage Traffic function. The strategy shall be selected by the process from a number that are available, e.g., adaptive control, fixed time control, local operations. The selected strategy shall be passed by the process to the actual control processes for implementation according to the part of the network to which it is to be applied, i.e., surface roads, freeways (i.e., limited access roads), ramps and/or parking lots. The definition of strategy can be extended to include a strategy for the operations of sensors such as video cameras used to provide traffic surveillance data. The process shall make it possible for the current strategy selection to be modified to accommodate the effects of such things as incidents, emergency vehicle preemption, the passage of commercial vehicles with unusual loads, equipment faults and overrides from the traffic operations personnel. The strategy for control of freeways and parking lots is through use of DMS signs and lane indicators. The strategy for control of ramps is through the timing plans for ramp meters. The selected strategy shall be sent to the process within the Provide Traffic Surveillance facility responsible for maintaining the store of long term data.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'current\_road\_network\_use';
- (b) 'cv\_incident\_override';
- (c) 'demand\_overrides';
- (d) 'emergency\_traffic\_control\_request';
- (e) 'ftop-strategy\_override';
- (f) 'ftop-video\_camera\_strategy\_change';
- (g) 'incident\_strategy\_override';
- (h) 'indicator\_fault\_state';
- (i) 'indicator\_input\_state\_for\_highways';
- (j) 'indicator\_input\_state\_for\_roads';
- (k) 'special\_vehicle\_priority\_routing';
- (l) 'other\_TMC\_cv\_incidents';
- (m) 'other\_TMC\_emergency\_data';
- (n) 'other\_TMC\_strategy\_data'.

Solicited Input Processing: This process shall receive the following data flows as a result of requests for data retrieval from local data stores:

- (a) 'static\_data\_for\_strategy'.

Unsolicited Output Processing: This process shall provide the following output flows regardless of any inputs that are received:

- (a) 'request\_other\_TMC\_data';
- (b) 'video\_camera\_control\_strategy'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'cv\_incidents\_for\_other\_TMC';
- (b) 'emergency\_data\_for\_other\_TMC';
- (c) 'selected\_parking\_lot\_control\_strategy';
- (d) 'selected\_ramp\_control\_strategy';
- (e) 'selected\_highway\_control\_strategy';
- (f) 'selected\_road\_control\_strategy';
- (g) 'selected\_strategy';
- (h) 'emergency\_traffic\_control\_response'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) determine the traffic control strategy that provides the best possible traffic conditions within the road network served by the Manage Traffic function. The definition of 'best' shall be a local policy decision. (An example might be a strategy that minimizes stops and delays thus reducing 'stop-start' travel and fuel consumption and the environmental impact of travel.);
- (c) in determining the strategy, the process shall be able to use data provided as input from other parts of the Manage Traffic function, unless countermanded by input from the traffic



operations personnel, or the default strategy in the store of static data, as well as the fault state of all indicator equipment;

(d) if no input is available from other parts of the Manage Traffic function, then the strategy defined in the store of static data shall be used;

(e) if in (d) no strategy is specified, the process shall allow all controlled equipment to operate under local control, setting all variable (dynamic) message sign (DMS) outputs to 'blank face' indicating that there is no message;

(f) where the inputs from other parts of the Manage Traffic function lead to conflicts in the required strategy to be selected, the process shall observe a locally determined order of priority. For example, the following order of priority might be followed: emergency vehicle route, incident strategy override, multimodal crossing inputs, operator strategy override, demand strategy override, low traffic volume route, commercial vehicle route, analysis of the road network use and background strategy selection from the store of static data;

(g) data for emergency and commercial vehicle routes sent from other the Manage Traffic function shall be given the same level of importance as those that originate locally (unless locally overridden);

(h) the process shall automatically cancel strategies selected by traffic operations personnel at a locally determined time and/or period after they were imposed, if they have not been canceled previously, to avoid unintended effects on the traffic control strategies for other days;

(i) when a new strategy has been determined, it shall be sent to other processes in the Manage Traffic function for implementation;

(j) the output in (i) shall only be sent to those processes that serve equipment specified in the new strategy;

(k) changes in the current strategy must always be immediately sent to another part of the Manage Traffic function for loading into the long term data store.

### **1.2.2.1 Determine Indicator State for Freeway Management**

Overview: This process shall implement selected traffic control strategies and transit vehicle overall priority on some or all of the indicators covering the freeway network served by the Manage Traffic function. It shall implement the strategies only using the indicators (e.g. dynamic message signs (DMS)) specified in the implementation request and shall coordinate its actions with those of the process that controls the road network. The process shall also be capable of monitoring the extra inputs that will arise where tunnels are involved, including the detection of fire and the consequent requirement to re-route traffic.

Data Flows: All input data flows are unsolicited and all output data flows are solicited with the exception of the following:

(a)'static\_data\_for\_highways', which is data accessed from a local data store.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) immediately implement any strategy requests only using the indicators specified in the request;
- (c) it shall be possible for the strategy request to require implementation on one, some or all the indicators that are available (and not faulty) in the freeway network served by the Manage Traffic function;
- (d) strategy implementation must make use of the freeway sign sequences to ensure that signs are set in a manner that is safe for all freeway users;
- (e) requests for high occupancy vehicle (hov) and transit priority shall be executed immediately but not take precedence over emergency vehicle routes;
- (f) special consideration must be given to conditions in tunnels and in particular to the need to automatically implement alternative traffic management strategies to route traffic away from fires or similar extreme hazards that may be detected;
- (g) the process shall use the strategy data input to monitor the effects of the currently selected strategies and make small adjustments which will further improve the efficiency of the current traffic flow;
- (h) transit priority shall be implemented on the indicators covering the requested route(s) and its confirmation of its implementation shall be sent back to the requesting process in the Manage Transit function;
- (i) the process shall implement any changes in control in a safe manner that does not in any way endanger vehicles and/or their drivers, pedestrians or operators of non-motorized vehicles;
- (j) send each change in strategy to another process in the Manage Traffic function for loading into the store of long term data;
- (k) send the required indicator state to another process in the Manage Traffic function for output to the roadside equipment that drives the indicators.

### **1.2.2.2 Determine Indicator State for Road Management**

Overview: This process shall implement selected traffic control strategies and transit priority on some or all of the indicators covering the road (surface street) network served by the Manage Traffic function. It shall implement the strategies only using the indicators (intersection and pedestrian controllers, dynamic message signs (DMS), etc.) that are specified in the implementation request and shall coordinate its actions with those of the processes that control the freeway network and the ramps that give access to the freeway network.

Data Flows: All input data flows are unsolicited and all output data flows are solicited with the exception of the following:

(a)'static\_data\_for\_roads', which is data received from a local data store.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) immediately implement any strategy requests only using the indicators specified in the request;
- (c) control all indicators that are intersection and pedestrian controllers using a methodology which responds to vehicles and pedestrians in a locally determined manner;
- (d) where vehicle and pedestrian responsive control cannot be implemented, or is not specified in the strategy request, the following traffic control methodologies shall be available to the process for implementation within some or all of the controlled network: fixed time control sequences (usually referred to as fixed time plans), the automatic selection of the most appropriate fixed time plan on the basis of current real time traffic data, the selection of special fixed time plans to cover such things as bridges opening when requested by the specific data input and the ability of one or more device(s) to operate under its own (local) control;
- (e) the process must be capable of implementing the required control strategy on one, some or all the indicators that are available (and not faulty) in the road network;
- (f) traffic control preemption shall be capable of being implemented for emergency or special priority vehicles;
- (g) requests for high occupancy vehicle (hov) and transit priority shall be executed immediately but not take precedence over emergency vehicle routes;
- (h) the process shall use the strategy data input to monitor the effects of the currently selected strategies and make any small adjustments which will further improve the efficiency of the traffic flow;
- (i) transit priority shall be implemented on the indicators covering the requested route(s) and confirmation of its implementation shall be sent back to the requesting process in the Manage Transit function;
- (j) the process shall implement any changes in control in a safe manner that does not in any way endanger vehicles and/or their drivers, pedestrians or operators of non-motorized vehicles;
- (k) send each change in strategy to another process in the Manage Traffic function for loading into the store of long term data;
- (l) send the required indicator state to another process in the Manage Traffic function for output to the roadside equipment that drives the indicators.

#### **1.2.4.1 Output Control Data for Roads**

Overview: This process shall transfer data to processes responsible for controlling equipment located at the roadside within the road (surface street) network served by the Manage Traffic function. Data for use by in-vehicle signage equipment shall be sent to another process for output to roadside processes. All data shall be sent to this process by processes within the Manage Traffic function. This process shall also be responsible for the monitoring of input data showing the way in which the indicators are responding to the data that they are being sent, and the reporting of any errors in their responses as faults to the Collect and Process Indicator Fault Data facility within the Manage Traffic function. All output and input data shall be sent by the process to another process in the Manage Traffic function to be loaded into the store of long term data.

Data Flows: All input data flows are unsolicited with the exception of static\_data\_for\_control which is solicited along with all output data flows.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when any change occurs to the input data, change the appropriate indicator output data;
- (c) as a result of (b), update the vehicle signage data, adding the location and identity of the route segments from which the indicator data can be seen from the static data for DMS allocation;
- (d) maintain communication with all indicators so that they will continue to obey the data contained in the data that is being sent to them;
- (e) immediately report all indicators that fail to respond to the commands in the data that they have been sent to the processes responsible for fault management.

### 1.2.4.2 Output Control Data for Freeways

Overview: This process shall transfer data to processes responsible for controlling equipment located at the roadside within the freeway network served by the Manage Traffic function. Data for use by in-vehicle signage equipment shall be sent to another process for output to roadside processes. All data shall have been sent to this process by processes within the Manage Traffic function. This process shall also be responsible for the monitoring of input data showing the way in which the indicators are responding to the data that they are being sent, and the reporting of any errors in their responses as faults to the Collect and Process Indicator Fault Data facility within the Manage Traffic function. All output and input data shall be sent by the process to another process in the Manage Traffic function to be loaded into the store of long term data.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'indicator\_input\_data';
- (b) 'indicator\_highway\_requested\_state';
- (c) 'indicator\_road\_requested\_state';
- (d) 'ramp\_signal\_state';
- (e) 'vehicle\_pollution\_message'.

Solicited Input Processing: This process shall receive the following data flows as a result of requests for data retrieval from local data stores:

- (a) 'static\_data\_for\_control'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'indicator\_control\_data';
- (b) 'indicator\_control\_monitoring\_data';
- (c) 'indicator\_control\_storage\_data';
- (d) 'indicator\_data\_fault';
- (e) 'indicator\_input\_state';
- (f) 'indicator\_input\_storage\_data';
- (g) 'vehicle\_sign\_data'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when any change occurs to the input data, change the appropriate indicator output data;
- (c) as a result of (b), update the vehicle signage data, adding the location and identity of the route segments from which the indicator data can be seen from the static data for DMS allocation;
- (d) maintain communication with all indicators so that they will continue to obey the data contained in the data that is being sent to them;
- (e) immediately report all indicators that fail to respond to the commands in the data that they have been sent to the processes responsible for fault management.

### 1.2.4.3 Output In-vehicle Signage Data

Overview: This process shall format and output data for use by roadside processes in creating in-vehicle signage. This process supports a full range of functionality for in-vehicle signage (from display of signage to location specific advisory data). The process shall be capable of outputting some or all of the following advisory data: link state data, current incidents, planned events, environmental conditions, and highway rail intersection status. The process shall be capable of outputting some or all of the following signage data: dynamic message sign contents or fixed signage. The data shall be structured by this process so that it can be output by each roadside process to vehicles for use by in-vehicle signage equipment.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a)'current\_incident\_data\_for\_vehicle\_signage';
- (b)'planned\_event\_data\_for\_vehicle\_signage';
- (c)'static\_data\_for\_vehicle\_signage';
- (d)'traffic\_data\_for\_signage';
- (e)'vehicle\_sign\_data\_for\_highways';
- (f)'vehicle\_sign\_data\_for\_roads'
- (g)'hri\_guidance\_for\_beacon\_message'
- (h)'environmental\_data\_for\_signage'.

Solicited Input Processing: This process shall receive the following data flows as a result of requests for data retrieval from local data stores:

- (a)'vehicle\_signage\_incident\_data'.

Solicited Output Processing: This process shall provide the following output flow as a result of the above inputs being received:

- (a)'vehicle\_sign\_data'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when any change occurs in either of 'current\_incident\_data\_for\_vehicle\_signage', 'planned\_event\_data\_for\_vehicle\_signage', 'traffic\_data\_for\_signage', 'vehicle\_sign\_data\_for\_highways', 'vehicle\_sign\_data\_for\_roads', 'environmental\_data\_for\_signage' or 'hri\_guidance\_for\_beacon\_message' data flows, then change the contents of the signage output data flow to be the same;
- (c) as a result of (b), output the vehicle signage data, filtering the incident data so that the roadside processes only receive data which is relevant to their location, and only providing the sign data that relates to the signs covered by each roadside process;
- (d) the process shall perform the incident location filtering using the roadside process location data in the 'static\_data\_for\_vehicle\_signage' data flow;
- (e) when new incident data is received in either of 'current\_incident\_data\_for\_vehicle\_signage' or 'planned\_event\_data\_for\_vehicle\_signage', load it into the store of incident data, updating any previously received data that relates to the same incident.

#### **1.2.4.4 Output Roadway Information Data**

Overview: This process shall transfer data to processes responsible for controlling roadway information devices such as dynamic message signs (DMS) and highway advisory radio (HAR) located at the roadside. The data contains outputs used to control and monitor the status of DMS and HAR. This process shall also be responsible for the monitoring of input data showing the way in which the roadway information devices are responding to the data that they are being sent, and the reporting of any errors in their responses as faults to the Collect and Process Indicator Fault Data facility within the Manage Traffic function. This process is also responsible for defining messages for DMS and HAR and sending configuration changes (i.e. blanking sign).

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'other\_roadway\_information\_data';
- (b) 'roadway\_information\_status';
- (c) 'dms\_updates';
- (d) 'hri\_guidance\_for\_dms';
- (e) 'vehicle\_pollution\_message';
- (f) 'parking\_guidance\_for\_dms';
- (g) 'har\_status';
- (h) 'dms\_status'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'roadway\_information\_data';
- (b) 'other\_roadway\_information\_status';
- (c) 'dms\_data';
- (d) 'har\_data';
- (e) 'indicator\_sign\_control\_data\_for\_hri'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when any change occurs to the input data, change the appropriate indicator output data;
- (c) as a result of;
- (d) maintain communication with all indicators so that they will continue to obey the data contained in the data that is being sent to them;
- (e) immediately report all indicators that fail to respond to the commands in the data that they have been sent to the processes responsible for fault management.

#### **1.2.6.1 Maintain Traffic and Sensor Static Data**

Overview: This process shall maintain the store of static and link data used by other processes within the Manage Traffic function. Link data shall also be sent to the Provide Driver and Traveler Services function to enable it to obtain data about links that are not in the geographic area which it serves.

Data Flows: All input flows are unsolicited with the exception of 'static\_data\_for\_traffic\_control\_copy' which is solicited. All output flows are solicited.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) communicate with other processes in the Manage Traffic function to obtain their current static data and to provide updates to that data;
- (c) when new static data is received and it has been successfully loaded into the store, output the static\_data\_store\_updated data flow so that other processes can receive new copies of the data.

### **1.2.6.2 Provide Static Data Store Output Interface**

Overview: This process shall provide updates of static data to other processes in the Provide Traffic Control facility of the Manage Traffic function. An update of the data shall only be provided when this process has been notified by another process that the contents of the store of static data has been changed. This process shall provide updates to the map update provider about changes to the static data of a particular region.

Unsolicited Input Processing: This process shall receive the following input unsolicited data flows:  
(a) 'static\_data\_store\_updated'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'static\_data\_for\_highways';
- (b) 'static\_data\_for\_highway\_control';
- (c) 'static\_data\_for\_road\_control';
- (d) 'static\_data\_for\_parking\_lots';
- (e) 'static\_data\_for\_ramps';
- (f) 'static\_data\_for\_roads';
- (g) 'static\_data\_for\_strategy';
- (h) 'static\_data\_for\_vehicle\_signage';
- (i) 'tmup-map\_static\_data';
- (j) 'static\_data\_for\_archive'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flow 'static\_data\_store\_updated';
- (b) when the flow in (a) has been received, read the data from the store of static data and send the solicited output flows listed above;

### **1.2.7.1 Process Indicator Output Data for Roads**

Overview: This process shall implement the indicator output data generated by other processes within the Manage Traffic function for use on the roads (surface streets) served by the function. It shall perform the functions needed to provide control at intersections or pedestrian crossings, or provide the interface for data to be sent to the units (or systems) that manage multimodal crossings or highway-rail intersections. This process shall monitor the status of the indicator equipment and provide fault status to the Manage Maintenance and Construction function to help that process determine whether the indicator is operating correctly or a repair is needed.

Data Flows: All input data flows are unsolicited inputs and all output data flows are solicited outputs.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) provide output data in a form which is easily understood by drivers and/or travelers, appears in a safe sequence, is unambiguous and does not provide conflicting instructions to drivers and travelers that are likely to result in circumstances which are life threatening;
- (c) all output must be maintained for a time period which is sufficient to enable them to be read, understood and reacted to, but not so long that they cause any new indication to be ignored;
- (d) if no input of control data is received for a continuous period of time to be locally determined, the process shall start to change its outputs based on local sensor data;
- (e) the outputs to the multimodal crossings shall be maintained for as long as the appropriate control signal is received from other processes, and if no such signals are being received shall be set to null, i.e., the multimodal crossing equipment is not expected to take any action.



### **1.2.7.2 Monitor Roadside Equipment Operation for Faults**

Overview: This process shall monitor the operation of the indicators in the road (surface street) and freeway network. It shall report any instances where the indicator response does not match that expected from the contents of the indicator control data it is receiving, and is verified against known indicator preemptions. A report shall be output by this process if equipment failure is detected and sent to another process in the Manage Traffic function to arrange for repair.

Unsolicited Input Processing: This process shall receive the following input unsolicited data flows:

- (a) 'indicator\_control\_monitoring\_data\_for\_highways';
- (b) 'indicator\_control\_monitoring\_data\_for\_roads';
- (c) 'indicator\_monitoring\_suspend';
- (d) 'indicator\_response\_data\_for\_highways';
- (e) 'indicator\_response\_data\_for\_roads'.

Solicited Output Processing: This process shall provide the following output flow as a result of the above inputs being received:

- (a) 'traffic\_control\_device\_status'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) output the 'traffic\_control\_device\_status' data flow if the indicator response data does not match the control monitoring data for a locally determined period of time, and a locally determined period of time has elapsed since the control monitoring data last changed.

### **1.2.7.3 Manage Indicator Preemptions**

Overview: This process shall receive indicator (e.g., signal) preemption and priority requests from other functions within ITS. These requests shall enable the process to give selected vehicles (e.g., those that belong to Transit Authorities or Emergency Services) signal preemption or priority at intersections, pedestrian crossings, and multimodal crossings in the freeways, surface streets and rural roadways served by the instance of the Manage Traffic function. Sending of the preemption or priority request output shall also generate an output to the monitoring process to suspend its activities while the preemption or priority request is being served. An output indicating preemption or priority has been granted shall be sent to the Manage Traffic and Manage Maintenance and Construction functions to help those processes determine whether a fault detected at the signal is a true malfunction or due to a signal override.

Unsolicited Input Processing: This process shall receive the following input unsolicited data flows:

- (a) 'emergency\_vehicle\_preemptions';
- (b) 'transit\_vehicle\_roadway\_priorities'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'indicator\_monitoring\_suspend';
- (b) 'indicator\_override\_for\_highways';
- (c) 'indicator\_override\_for\_roads';
- (d) 'signal\_override\_equip\_status\_for\_m\_and\_c';
- (e) 'signal\_override\_status'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) maintain both output flows for as long as any of the input flows are present;
- (c) remove the output flows when the input flows cease to exist.

#### **1.2.7.4 Process In-vehicle Signage Data**

Overview: This process shall output data for use by in-vehicle signage equipment on vehicles traveling along the road (surface street) and freeway network served by the Manage Traffic function. This data shall be able to provide information from any of the types of indicators that are supported by the function, e.g. intersection controller, pedestrian controller, dynamic message sign (DMS), plus data about incidents and link information such as speed, travel times or roadway conditions. The process shall be responsible for its own fault monitoring, which shall check that output data is being sent and that it is an accurate representation of the input data. When a fault is detected this process shall report it to the Manage Traffic and Manage Maintenance and Construction processes which are responsible for the monitoring of roadside equipment faults.

Unsolicited Input Processing: This process shall receive the following input unsolicited data flows:  
(a) 'vehicle\_sign\_data'.

Solicited Output Processing: This process shall provide the following output flow as a result of the above inputs being received:  
(a) 'vehicle\_signage\_data'.

Unsolicited Output Processing: This process shall provide the following output unsolicited flows:  
(a) 'vehicle\_sign equip\_status\_for\_m\_and\_c';  
(b) 'vehicle\_sign\_data\_status'.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor for receipt of the unsolicited input flow listed above;  
(b) continuously generate the 'vehicle\_signage\_data' solicited output flow, making sure that it accurately reflects the data received in (a);  
(c) detect any processing faults, such as input data does not match output data, or data output failed;  
(d) if a fault is detected in (c), send the 'vehicle\_sign equip\_status\_for\_m\_and\_c' and 'vehicle\_sign\_data\_status' solicited output flows to the fault monitoring process.

#### **1.2.7.5 Process Indicator Output Data for Freeways**

Overview: This process shall implement the indicator output data generated by other processes within the Manage Traffic function for use on freeways served by the function. It shall perform the functions needed to output control data to ramp metering controllers or provide the interface for data to be sent to the units (or systems) that manage multimodal crossings. This process shall monitor the status of the indicator equipment and provide fault status to the Manage Maintenance and Construction function to help that process determine whether the indicator is operating correctly or a repair is needed.

Data Flows: All input data flows are unsolicited inputs and all output data flows are solicited outputs.

Functional Requirements: This process shall:  
(a) continuously monitor for receipt of the input flows listed above;  
(b) provide output data in a form which is easily understood by drivers and/or travelers, appears in a safe sequence, is unambiguous and does not provide conflicting instructions to drivers and travelers that are likely to result in circumstances which are life threatening;  
(c) all output must be maintained for a time period which is sufficient to enable them to be read, understood and reacted to, but not so long that they cause any new indication to be ignored;  
(d) if no input of control data is received for a continuous period of time to be locally determined, the process shall start to change its outputs based on local sensor data;  
(e) the outputs to the multimodal crossings shall be maintained for as long as the appropriate control signal is received from other processes, and if no such signals are being received shall be set to null, i.e., the multimodal crossing equipment is not expected to take any action.

### **1.2.7.8 Provide Device Interface to Other Roadway Devices**

Overview: This process shall provide the interface between roadway devices and other roadway devices (considered to be contained in the Other Roadway terminator) for the exchange of data, status, and control. The Other Roadway can be adjacent geographically, under control of a different jurisdiction, or part of a more complex hierarchy. The devices described by ITS processes that will send data and status to the Other Roadway terminator (and receive control signals from the Other Roadway terminator) include controllers(arterial or freeway), roadway information systems (e.g. dynamic message signs), roadway auto-treatment systems, and work zone intrusion alert systems. This process supports autonomous traffic information dissemination without the need for direct control from a Manage Traffic function. This process also supports the interconnection of controllers (e.g. intersection or ramp meter) in peer or hierarchical arrangements.

Data Flows: All input data flows are unsolicited inputs and all output data flows are solicited outputs.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flows;
- (b) provide output data in a form which is easily understood by drivers and/or travelers, appears in a safe sequence, is unambiguous and does not provide conflicting instructions to drivers and travelers that are likely to result in circumstances which are life threatening;
- (c) all output must be maintained for a time period which is sufficient to enable them to be read, understood and reacted to, but not so long that they cause any new indication to be ignored;
- (d) if no input of fresh control data is received for a locally determined continuous period of time, the process shall start to change its outputs based on local sensor data, and shall clear (blank) the outputs containing advisory message texts.

### **1.2.7.9 Process Roadway Information Data**

Overview: This process shall implement the presentation of roadway information data to drivers on the roads (surface streets) and highways served by the function. It shall generate the output for dynamic message signs (DMS) and highway advisory radios (HAR). The DMS may be either those that display variable text messages, or those that have fixed format display(s) (e.g. vehicle restrictions, or lane open/close). The process shall accept device control commands from other processes and shall provide status and fault data to the processes that originate control.

Functional Requirements: None.

### **1.2.8.1 Collect Indicator Fault Data**

Overview: This process shall collect data about faults in the operation of indicators (e.g., signals, DMS, HAR) that have been detected by processes in other parts of the Manage Traffic function. It shall be possible for the faults to be detected locally at the indicators, or centrally through communications links with the indicators.

Unsolicited Input Processing: This process shall receive the following input unsolicited data flows:

- (a) 'indicator\_data\_fault\_for\_highways';
- (b) 'indicator\_data\_fault\_for\_roads';
- (c) 'traffic\_control\_device\_status';
- (d) 'smart\_probe\_reader\_status';
- (e) 'video\_device\_status';
- (f) 'vehicle\_sign\_data\_status'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'indicator\_new\_fault\_update'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when any of the data flows in (a) are received, pass the data on to another process for storage and the activation of fault reporting processes.

### **1.2.8.2 Maintain Indicator Fault Data Store**

Overview: This process shall collect data about indicator faults that have been detected by processes in other parts of the Manage Traffic function. It shall be possible for the faults to have been detected locally at the indicators, or centrally through communications links with the indicators. The process shall pass on new fault data to another process for communication to the Manage Maintenance and Construction function and shall receive fault clearances from the same process communicating with that function. It shall also maintain a store of the current fault state of all indicators. The process shall provide facilities that enable traffic operations personnel to review and update the current fault status of all indicators. Details of faulty and fixed equipment shall be passed by the process to the traffic control strategy selection process so that it can adjust its strategy to take account of the current fault(s).

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'indicator\_current\_fault\_update';
- (b) 'indicator\_new\_fault\_update';
- (c) 'indicator\_fault\_clearance\_update';
- (d) 'indicator\_new\_fault\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'indicator\_current\_fault\_data';
- (b) 'indicator\_current\_faults\_list';
- (c) 'indicator\_fault\_state';
- (d) 'indicator\_new\_fault'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) the process shall be responsible for the maintenance of the store of the current indicator fault state data, modifying the store as necessary based on the unsolicited input data flows;
- (c) If the indicator\_current\_faults\_list data store changes, update and issue the solicited output flows.

### **1.2.8.3 Provide Device Fault Interface for M and C**

Overview: This process shall provide an interface for the exchange of data between the Manage Traffic and Manage Maintenance and Construction functions concerning the status of field equipment. This data will then be used by another process to schedule equipment repairs. This process shall send data containing details of new equipment faults, and to receive clearances when the faults are cleared.

Functional Requirements: None.

### **1.2.8.4 Provide Traffic Operations Personnel Indicator Fault Interface**

Overview: This process shall provide the interface through which traffic operations personnel access data about faults on indicator equipment controlled by the Manage Traffic function. The process shall enable the personnel to monitor all indicator equipment faults that have been detected, and if necessary, amend that data. It shall also enable the traffic operations personnel to manually input faults in cases where they cannot otherwise be detected.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'ftop-indicator\_fault\_data\_input';
- (b) 'ftop-indicator\_fault\_data\_request';
- (c) 'ftop-indicator\_fault\_data\_update'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval:

- (a) 'indicator\_current\_fault\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'indicator\_current\_fault\_update';
- (b) 'indicator\_new\_fault\_data';
- (c) 'ttop-current\_indicator\_faults'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) be capable of accepting input from Traffic Operations Personnel;
- (c) be capable of carrying out its own verification of input data received from Traffic Operations Personnel and generating the correct solicited output data flow as a result of input data being received;
- (d) as part of the output generation process, carrying out checks for data out of range, missing or spurious values and requesting re-input where required;
- (e) providing all output to Traffic Operations Personnel in a form that is readily understood by a human operator.

### **1.3.1.1 Analyze Traffic Data for Incidents**

Overview: This process shall analyze traffic sensor data, vehicle probe data, or video images for anomalies that could indicate occurrence of an incident, including video images at work zones. The data may be collected from roads (surface street) and/or highways served by the Manage Traffic function. The process shall pass on any anomalies that it detects to another process in the Manage Incidents facility as possible detected incidents.

Unsolicited Input Processing: This process shall receive the following input unsolicited data flows:

- (a) 'incident\_analysis\_data';
- (b) 'current\_road\_network\_use';
- (c) 'traffic\_image\_data';
- (d) 'unusual\_data';
- (e) 'hri\_incident\_data';
- (f) 'work\_zone\_images\_for\_traffic'.

Solicited Input Processing: This process shall receive the following data flows from a local data store:

- (a) 'static\_data\_for\_incident\_management'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above unsolicited inputs being received:

- (a) 'possible\_detected\_incidents';
- (b) 'reversible\_lane\_status'.

Functional Requirements: This process shall:

- (a) run whenever any of the unsolicited data flows listed above is received;
- (b) analyze the unsolicited data and identify any anomalies and their location which indicate that traffic is not flowing as expected;
- (c) when anomalies in the traffic flow are detected in (b), report them as possible incidents using the solicited output data flow 'possible\_detected\_incidents' and 'reversible\_lane\_status'.

### **1.3.1.2 Maintain Static Data for Incident Management**

Overview: This process shall maintain the store of static data (data about the location and features of the road or highway links in the transportation network). This data store is used by another process within the Manage Incidents facility to identify and locate incidents. The static data shall be input to this process from another process and it shall be possible for that process to request a copy of the current static data.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'supply\_incident\_static\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'static\_data\_for\_incident\_management';
- (b) 'current\_incident\_static\_data'.

Functional Requirements: This process shall:

- (a) run when either the unsolicited data flow is received;
- (b) as updates are made to the incident static data, load the contents into the output data flow 'current\_incident\_static\_data';
- (c) when the 'supply\_incident\_static\_data' unsolicited data flow is received, load the contents into the store of static data, overwriting any data already present;

### **1.3.1.3 Process Traffic Images**

Overview: This process shall process raw traffic image data received from sensors located on the road (surface street) and freeway network served by the Manage Traffic function. The process shall transform the raw data into images that can be sent to another process for incident or work zone intrusion detection. It shall also act as the control interface through which the images of traffic conditions can be changed by the traffic operations personnel and maintenance and construction center personnel, who shall also be supplied with images for viewing. This process shall also provide sensor equipment fault information to other processes in the Manage Traffic and Manage Maintenance and Construction functions that are monitoring the health of field equipment so that repairs can be scheduled by those other processes if deemed necessary.

Unsolicited Input Processing: This process shall receive the following input unsolicited data flows:  
(a) 'ftrf-traffic\_images'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'traffic\_image\_data'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flow 'ftrf-traffic\_images';
- (b) transform the data in (a) into a form in which it can be sent for analysis by another process;
- (c) send the data generated in (b) to the data analysis process using the solicited output flow 'traffic\_image\_data';
- (d) at the same time as the data in (c) is output, generate the incident image data flow and send it to the traffic operations personnel interface and maintenance and construction center personnel interface process;
- (e) when the video camera control data flow is received, implement the data it contains to effect the required changes to the system operational parameters.

### 1.3.2.1 Store Possible Incident Data

Overview: This process shall receive data on possible incidents from other processes within the Manage Incidents function and from other ITS functions. The process shall receive observation and forecast data from the Weather Service and Surface Transportation Weather Services terminators. The process shall receive event information from the Event Promoter terminator. The process shall load all data that it receives into the store of possible incidents. Types of incidents that could be received include special vehicle routes, work zone activity, road weather information, pollution incidents, as well as traffic incidents. As part of the loading activity, the process shall enter the data into the relevant parts of the standard format for incident data, and shall assign a level of confidence (e.g. related to the source of the data or time of its detection) to that data. Once data is loaded into the store an update notification is sent to another process to review and classify the possible incidents.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'logged\_special\_vehicle\_route';
- (b) 'm\_and\_c\_work\_plans\_for\_traffic';
- (c) 'fevp-event\_information';
- (d) 'fws-current\_weather\_observations';
- (e) 'fws-weather\_forecasts';
- (f) 'pollution\_incident';
- (g) 'possible\_detected\_incidents';
- (h) 'media\_incident\_data\_updates';
- (i) 'environmental\_data\_for\_incidents';
- (j) 'fstws-surface\_trans\_weather\_observations';
- (k) 'fstws-surface\_trans\_weather\_forecasts';
- (l) 'work\_zone\_info\_for\_traffic';
- (m) 'incident\_info\_for\_traffic';
- (n) 'road\_weather\_info\_for\_traffic'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'possible\_incident\_data\_update';
- (b) 'possible\_incidents'.

Functional Requirements: This process shall:

- (a) run whenever any of the unsolicited data inputs listed above is received;
- (b) be capable of receiving the input data in a variety of formats and converting it into a single format suitable for use with the store of possible\_incidents data;
- (c) when possible\_incident data is being stored, a level of confidence must be attached to it so that the accuracy of the data can be rated according to its source;



### **1.3.2.2 Review and Classify Possible Incidents**

Overview: This process shall review input data about possible incidents and provide verification of the incident. The process shall have the capability of using algorithms to automatically identify and verify an incident. The process shall have the capability to classify an incident as a current incident or a planned event (such as a multimodal crossing) and shall output that potential incident data to another process for storage. The process shall report any incidents that it is unable to verify or classify to the traffic operations personnel for manual verification and classification. The process shall allow the traffic operations personnel to request all possible incidents and carry out the verification and classification process manually. This process shall provide feedback on proposed maintenance and construction work plans and proposed event plans.

Data Flows: The following input flows are unsolicited: request\_possible\_incidents\_data, incident\_details, possible\_incidents\_data\_update, fmmc-crossing\_closure\_schedule. The following input flows are solicited: operations\_incident\_data\_updates, incident\_details, and possible\_incidents. All outputs are solicited with the exception of incident\_details\_request which is generated if no input is received in the incident\_details for a locally determined period.

Functional Requirements: This process shall:

- (a) run when any of the unsolicited data flows described above is received;
- (b) be capable of automatically determining which possible incidents can be converted into real incidents (i.e., are not false alarms) and further classifying the real incidents as planned events or current incidents;
- (c) the incident classification process shall use the level of confidence data attached to each set of possible incident data;
- (d) if the classification cannot be done automatically with a locally determined level of confidence, send the data to the Traffic Operations Personnel via the 'possible\_incidents\_data\_output' output data flow, for manual classification;
- (e) where necessary, format the data for a possible incident into the standard form, adding in any missing fields if necessary, and adding in the traffic impact data field;
- (f) when a possible incident has been classified: output it to another process for storage in the planned events or current incidents data stores, send data flows to activate the process responsible for reviewing either planned events or current incidents, and send the appropriate message to other parts of the ITS;
- (g) new data read from the store of possible\_incidents which is found to complement data already in the planned events or current incidents data stores, will be merged, with any additional data items in the new data shall be output for storage by another process.
- (h) review the current and planned incidents, and provide feedback regarding event plans and maintenance and construction work plans.

### **1.3.2.3 Review and Classify Planned Events**

Overview: This process shall receive updates of planned events and review the complete list of them to determine when an incident should be reclassified from planned event to current incident. It shall carry out the re-classification process automatically either upon receiving notice that the store of planned events has been updated, or at some periodic rate. The criteria for reclassifying an incident could be that the planned start time of the event has passed. The process shall request details of planned events from the process that manages their data store and shall send details of any new (re-classified) current incidents to the process that manages their data store. It shall also provide updates of planned events and current incidents to other ITS functions, and details of any new planned events to the process responsible for the output of data to vehicle signage functions.

Data Flows: All inputs are unsolicited except for 'planned\_events\_data' which is solicited as are all outputs.

Functional Requirements: This process shall:

- (a) continuously monitor for the unsolicited input data flows listed above;
- (b) carrying out the incident re-classification process on receipt of either the 'reclassify\_incidents', 'incident\_data\_update' or 'incident\_response\_status' data flows, or when planned events are expected to become current, or in the absence of any inputs on a regular (locally determined time interval) basis;
- (c) when the 'incident\_data\_update' unsolicited input data flow indicates that a new planned event has been found, send the incident details to the process that outputs data to roadside signage processes, using the 'planned\_event\_data\_for\_vehicle\_signage' solicited output data flow;
- (d) when the 'incident\_data\_update' unsolicited input data flow indicates that a new current incident has been found, request the current incidents data and output that for the new incident to the process responsible for providing incident responses;
- (e) automatically re-classify incidents from planned events to current incidents based on the time at which the incident is expected to take place;
- (f) when an incident is re-classified from planned event to current incident, send out the data for the new current incident to other parts of ITS, and the data flow to activate the process responsible for responding to incidents.

#### **1.3.2.4 Provide Planned Events Store Interface**

Overview: This process shall provide the interface to, and manage the use of the store containing details of planned events. The process shall enter details of all new planned events into the store, retrieve details on request, and delete details of an incident when it has been re-classified as a current incident. The process shall be able to receive details of planned events from within the local Manage Incidents facility, and from similar facilities in other Traffic Management Centers (TMCs). When requested, the process shall also be able to provide details of its planned events to the Manage Incidents facilities in other TMCs.

Data Flows: All inputs are unsolicited with the exception of 'planned\_events\_store' and 'other\_planned\_events' which are solicited. All outputs are solicited with the exception of 'request\_other\_planned\_events\_data', an unsolicited output generated regardless of the inputs received.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) the incident data shall be stored and accessed from the 'planned\_events\_store';
- (c) each time data about a new planned event is loaded into the 'planned\_events\_store', the process shall also pass that data on to other parts of the Manage Traffic function through the output of the planned events data flow;
- (d) if the incident may affect traffic outside the local geographic or jurisdictional area served by the instance of the function, then the data about the incident shall be sent to other TMS's using the 'planned\_events\_data\_output' data flow;
- (e) when initially run, request data on planned events that may affect local traffic from other TMS's using the 'request\_other\_planned\_events\_data' data flow;
- (f) when data about planned events in geographic or jurisdictional areas served by other TMS's is received, it shall be loaded into the store of planned events and processed as though the incident(s) had just occurred;
- (g) when a request for local planned event data is received, only data on those planned events that may affect traffic outside the geographic or jurisdictional area served by the instance of the function shall be retrieved from the data store and sent to the requesting TMS in the 'planned\_events\_local\_data' data flow.

### **1.3.2.5 Provide Current Incidents Store Interface**

Overview: This process shall provide the interface to, and manage the use of the store of current incident details. The process shall enter the details of all new current incidents into the store, retrieve details on request, and delete details of incidents when they cease to be current. The process shall be able to receive details of current incidents from within the local Manage Incidents facility, and from similar facilities in other Traffic Management Centers (TMCs). When requested, the process shall also be able to provide details of its current incidents to the Manage Incidents facilities in other TMCs.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'current\_incidents\_data\_update';
- (b) 'current\_incidents\_data\_request';
- (c) 'current\_incidents\_new\_data';
- (d) 'arequest\_local\_current\_incidents\_data'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval:

- (a) 'current\_incidents\_store' - which contains data retrieved from a data store;
- (b) 'other\_current\_incidents' - which contains data received from another process.

Unsolicited Output Processing: This process shall provide the following output flow regardless of any input flows that are received:

- (a) 'request\_other\_current\_incidents\_data';

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'current\_incidents\_data';
- (b) 'current\_incidents\_store';
- (c) 'request\_other\_current\_incidents\_data'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) each time data about a new current incident is received via either the 'current\_incidents\_data\_update' or 'current\_incidents\_new\_data' unsolicited input data flows, it shall be loaded into the store;
- (c) when initially run, request data on current incidents that may affect local traffic from other TMCs using the 'request\_other\_current\_incidents\_data' data flow;
- (d) when data about current incidents in geographic or jurisdictional areas served by other TMCs is received, it shall be loaded into the store of current incidents and processed as though the incident(s) had just occurred;

### 1.3.3 Respond to Current Incidents

Overview: This process shall provide responses, including roadside advisories and notification of other agencies, to incidents that become current, i.e. active. Three general strategies for response to incidents can be supported by the process: 1) Operator enters a response (there is no set of predetermined responses), 2) the operator selects a response from a set of predetermined responses (possibly modifying the response), and 3) the process automatically accesses and implements a response from a set of predetermined responses (while informing the operator of the actions taken). Where predetermined responses are utilized, the operator shall have the capability to view, modify, or override the predetermined response. The predetermined response to each type of incident shall be defined for the process in the store defined\_responses\_data. If the process cannot find a predetermined response for a particular incident, it shall send the details of the incident to the traffic operations personnel so that they can provide an update to the store of predetermined responses. The process shall output the predetermined responses to an incident when it receives notification from another process in the Manage Incidents function that a new current incident has occurred. At the same time it shall also output the incident data to the process responsible for providing broadcast data to roadside processes and to the Manage Maintenance and Construction process for coordination with its activities. The other process in the Manage Incidents function shall also provide details of incidents that have ceased to be current (terminated) so that this process can send out data to clear the actions requested and broadcast such information to the roadside.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'current\_incidents\_data\_output'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval:  
(a) 'defined\_responses\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'current\_incident\_data\_for\_vehicle\_signage';
- (b) 'incident\_alert';
- (c) 'incident\_response\_clear';
- (d) 'incident\_response\_log';
- (e) 'incident\_strategy\_override';
- (f) 'cv\_incident\_override';
- (g) 'undefined\_incident\_response';
- (h) 'dms\_updates';
- (i) 'incident\_info\_from\_traffic'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flow 'current\_incidents\_data\_output';
- (b) analyze the current incident data against the data in the store of defined responses to determine the appropriate response;
- (c) generate the appropriate solicited output flows listed above as a result of determining the appropriate defined response to an incident;
- (d) generate the appropriate clearance data in the solicited output flows listed above when the duration of an incident expires;
- (e) if a defined response is not found for any incident, then the process shall send data about the incident to the Provide Traffic Operations Personnel Incident Data Interface process and take no further action;

### 1.3.4.1 Retrieve Incident Data

Overview: This process shall retrieve incident data from the stores of planned events and current incidents that are managed by other processes in the Manage Incidents facility of the Manage Traffic function. The process shall retrieve data as the result of a request which may come from the traffic operations personnel or the media. The output shall be returned to the source of the request.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'request\_incident\_operations\_data';
- (b) 'request\_incident\_media\_data'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval:

- (a) 'current\_incidents';
- (b) 'planned\_events\_data';
- (c) 'possible\_incidents\_data';
- (d) 'map\_data\_for\_incident\_display'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'current\_incidents\_request';
- (b) 'request\_possible\_incidents\_data';
- (c) 'retrieved\_incident\_media\_data';
- (d) 'retrieved\_incident\_operations\_data'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input data flows 'request\_incident\_operations\_data' and 'request\_incident\_media\_data';
- (b) when either of the flows in (a) is received, request the required incident data from the appropriate store interface process using solicited output data flows 'current\_incidents\_request' or 'request\_possible\_incidents\_data';
- (c) when the appropriate solicited input data flow is received in response to (b), integrate the stored map\_data\_for\_incident\_display with the incident data if necessary;
- (d) when (c) is completed, send the data to the process from which the data flow in (a) was received.

-----  
SIZING ATTRIBUTES

SIZE=64;

### **1.3.4.2 Provide Traffic Operations Personnel Incident Data Interface**

Overview: This process shall provide the interface between the traffic operations personnel and the Manage Incidents facility of the Manage Traffic function. It shall enable the personnel to request and amend details of current incidents, planned events, and predetermined incident responses. This shall allow the personnel to obtain and control incident video image data and manually re-classify incidents as possible or current or a planned event. It shall also output to the traffic operations personnel incident details to which no predetermined response currently exists. The process shall support inputs from and outputs to the traffic operations personnel. Where appropriate and/or requested by the traffic operations personnel, the process shall provide the output 'display' in a form incorporating a map of the relevant part(s) of the freeways, surface street and rural roadways served by the function. The process shall obtain the map from a local data store, which it shall request to be updated by another process as and when required.

Data Flows: All inputs are unsolicited with the exception of 'defined\_incident\_response\_data', 'retrieved\_incident\_operations\_data', and 'wrong\_way\_vehicle\_detection'; which are solicited along with all output flows.

Functional Requirements: This process shall:

- (a) continuously monitor the input data flows and provide acknowledgement of receipt of those from Traffic Operations Personnel;
- (b) be capable of accepting input from Traffic Operations Personnel;
- (c) be capable of carrying out its own verification of input data received from Traffic Operations Personnel and generating the correct solicited output data flow as a result of data being received;
- (d) as part of the output generation process, checking for data out of range, missing or spurious values and requesting re-input where required;
- (e) provide output to Traffic Operations Personnel in a form that is readily understood by a human operator;
- (f) only generate the outputs listed above as a result of receiving inputs from the Traffic Operations Personnel or other processes;
- (g) when the request for changes to the parameters affecting the operation of the sensor systems (e.g. closed circuit television) responsible for providing sensed images of incidents (including but not limited to video) are received from traffic operations personnel (ftop-incident\_camera\_action\_request), generate the incident\_video\_image\_control data flow to the image processing facility;
- (h) when video images of incidents are received (incident\_video\_image), output them as ttop-incident\_video\_image\_output to the traffic operations personnel;
- (i) the use of the digitized map display shall be automatic and shall be at a resolution best suited to the quantity and scope of data being displayed, i.e. the map shall be to the largest possible scale.

### **1.3.4.3 Provide Media Incident Data Interface**

Overview: This process shall provide the interface between the Media and the Manage Incidents facility. It shall enable the media to request details of incidents and shall allow transmission of incident information to the media. The media shall also provide raw input data on possible incidents. The process shall enable the output to incorporate a map of the area to which the incidents relate.

Data Flows: All inputs are unsolicited with the exception of 'retrieved\_incident\_media\_data' which is solicited as are all outputs.

Functional Requirements: This process shall:

- (a) continuously monitor the input data flows and acknowledge receipt of those from the Media;
- (b) be capable of accepting input from the Media;
- (c) be capable of carrying out its own verification of input data received from the Media and generating the correct solicited output data flow as a result of the input data being received;
- (d) as part of the output generation process, carry out checks for data out of range, missing or spurious values and request re-input where necessary;
- (e) use the 'media\_incident\_data\_updates' solicited output data flow to send data on a possible incident when this possible incident data is received from the Media in 'fm-incident\_information';
- (f) provide all output to the Media in a form that is readily understood;
- (g) only generate the outputs listed above as a result of receiving inputs from the Media or the other processes;
- (h) the use of the digitized map display shall be automatic and shall be at a resolution best suited to the quantity and scope of data being displayed, i.e. the map shall be to the largest possible scale.

### **1.3.4.4 Update Incident Display Map Data**

Overview: This process shall provide updates to the store of digitized map data used with displays of incident data produced by processes in the Manage Incidents facility of the Manage Traffic function. The process shall obtain the new data from a map provider or other appropriate data source, on receiving an update request from the traffic operations personnel interface process within the Manage Incidents facility.

Data Flows: Input flow 'request\_incident\_map\_display\_update' is unsolicited while 'fmup-incident\_display\_update' and all outputs are solicited.

Functional Requirements: This process shall:

- (a) continuously monitor for the receipt of the 'request\_incident\_map\_display\_update' unsolicited data flow;
- (b) when the data flow in (a) is received, generate the 'tmup-request\_incident\_display\_update' solicited output data flow and continuously monitor for receipt of the 'fmup-incident\_display\_update' solicited input data flow;
- (c) when the 'fmup-incident\_display\_update' flow is received, output the 'map\_data\_for\_incident\_display' solicited output data flow shown above.



### **1.3.4.5 Manage Resources for Incidents**

Overview: This process shall provide the capability for the Manage Traffic function to generate and receive requests for resources in responding to incidents. The process shall provide the capability for traffic operations personnel to request resources from the Manage Maintenance and Construction function to provide equipment and support for incident response and clean up. The process shall be able to receive resource requests from the Manage Emergency function and respond with the status of the response by Maintenance and Construction or the traffic operations personnel.

Functional Requirements: None.

### **1.3.5 Manage Possible Predetermined Responses Store**

Overview: This process shall manage the data store containing possible predetermined responses to incidents used within the Manage Incidents facility. These responses shall be those that another process within the facility has found to be worth including in the store of predetermined responses from an analysis of the incident response log. This process shall enable retrieval of the data from the store for presentation to traffic operations personnel and its possible transfer to the process that manages the store of predetermined incident responses that are actually used by other processes in the Manage Incidents facility.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'defined\_incident\_response\_update\_request';
- (b) 'possible\_defined\_responses\_data';
- (c) 'possible\_defined\_responses\_output\_request'.

Solicited Input Processing: This process shall receive the following data flows as a result of requests for data retrieval:

- (a) 'possible\_defined\_responses'

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'defined\_incident\_response\_changes';
- (b) 'possible\_defined\_responses\_output'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the request is received for the transfer of a possible response to the process managing the store of defined responses ('defined\_incident\_response\_update\_request'), the response data shall be deleted from the store of possible responses once the transfer of the 'defined\_incident\_response\_changes' data flow has been successfully completed;

### **1.3.6 Manage Predetermined Incident Response Data**

Overview: This process shall manage data held in the store of predetermined incident responses that are used by processes within the Manage Incidents facility of the Manage Traffic function. The process shall provide details of the current predetermined responses in response to requests from traffic operations personnel, and shall also update the store with new responses received from the process that manages the store of possible predetermined responses.

Unsolicited Input Processing: This process shall receive the following input unsolicited data flows:

- (a) 'defined\_incident\_response\_data\_request';
- (b) 'defined\_incident\_response\_changes';
- (c) 'defined\_incident\_response\_updates'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval:

- (a) 'defined\_responses\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above unsolicited inputs being received:

- (a) 'defined\_responses\_data';
- (b) 'defined\_incident\_response\_data'.

Functional Requirements: This process shall:

- (a) run whenever any of the unsolicited data flows shown above is received;
- (b) if the data flow in (a) is a 'defined\_incident\_response\_data\_request' request for data, retrieve it from the store of defined responses and return it to the requesting process in the 'defined\_incident\_response\_data' solicited output flow listed above;
- (c) if the data flow in (a) contains new data for the store of defined responses, load it into the store.

### **1.3.7 Analyze Incident Response Log**

Overview: This process shall analyze the data in the log of incident responses within the Manage Incidents facility of the Manage Traffic functions. The process shall analyze the log so that possible standard predetermined incident responses can be identified from the data in the incident\_response\_log data store. Any such possible standard predetermined responses that are identified shall be passed by this process to the process that manages the store of possible predetermined responses.

Solicited Input Processing: This process shall receive the following data flows as a result of requests for data retrieval:

- (a) 'incident\_response\_log'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'possible\_defined\_responses\_data'.

Functional Requirements: This process shall:

- (a) analyze the data in the log of incident responses data to determine any response patterns that could be used as standards for the responses to particular types of incidents;
- (b) send identified possible standard defined responses to the process that enables them to be stored and reviewed by the traffic operations personnel.

### 1.4.1 Provide Traffic Operations Personnel Demand Interface

Overview: This process shall provide the interface between the traffic operations personnel and the processes and data stores used within the Manage Demand facility of the Manage Traffic function. It shall enable the traffic operations personnel to access the data used as input by the demand forecasting process and the results of that process, to request that the input data be updated, set the policies used as input to the Calculate Forecast Demand process, to request that the demand forecasting process runs, and to run the process that implements the results. Where appropriate and/or requested by the traffic operations personnel, the process shall provide the output in a form that includes a map of the relevant part(s) of the road and freeway network served by the Manage Travel Demand function. The process shall obtain the map from a local data store, which it shall request to be updated by another process when required.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'ftop-demand\_policy\_information\_request';
- (b) 'ftop-demand\_policy\_updates';
- (c) 'ftop-demand\_data\_update\_request';
- (d) 'ftop-demand\_data\_request';
- (e) 'ftop-demand\_forecast\_request';
- (f) 'ftop-demand\_policy\_activation';

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval:

- (a) 'demand\_management\_result';
- (b) 'demand\_input\_data';
- (c) 'demand\_policy\_data';
- (d) 'demand\_forecast\_data';
- (e) 'demand\_forecast\_result';
- (f) 'map\_data\_for\_demand\_display'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'ttop-demand\_policy\_information';
- (b) 'ttop-demand\_data';
- (c) 'ttop-demand\_forecast\_data';
- (d) 'ttop-demand\_policy\_activation\_result';
- (e) 'ttop-demand\_forecast\_result';
- (f) 'demand\_data\_update\_request';
- (g) 'demand\_forecast\_request';
- (h) 'demand\_management\_activate';
- (i) 'request\_demand\_display\_update'.

Functional Requirements: This process shall:

- (a) continuously monitor the input data flows and provide acknowledgement of receipt of those from Traffic Operations Personnel;
- (b) be capable of accepting input from traffic operations personnel;
- (c) be capable of carrying out its own verification of input data received from traffic operations personnel and generating the correct solicited output data flow as a result of the input data being received;
- (d) as part of the output generation process, carrying out checks for data out of range, missing or spurious values and requesting re-input where necessary;
- (e) providing all output to traffic operations personnel in a form that is readily understood by a human operator;
- (f) only generate the outputs listed above as a result of receiving inputs from the traffic operations personnel or the other processes;
- (g) as locally determined generate the 'request\_demand\_display\_update' request for new map data;
- (h) the use of the map data shall be automatic and shall be at a resolution best suited to the quantity and scope of data being displayed, i.e. the map shall be to the largest possible scale.

## 1.4.2 Collect Demand Forecast Data

Overview: This process shall collect data from other ITS functions for use as input to the demand forecasting process within the Manage Demand facility of the Manage Traffic function. The process shall collect data from the Weather Service terminator to support demand forecasting. The process shall support data retrieval from other functions on request from the traffic operations personnel and through the receipt of unsolicited data from ITS functions. It shall load all the data that it receives in a consistent format into the input store used by the demand forecasting process.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'unusual\_congestion';
- (b) 'current\_transit\_routes\_use';
- (c) 'current\_other\_routes\_use';
- (d) 'fws-current\_weather\_observations';
- (e) 'fws-weather\_forecasts';
- (f) 'demand\_data\_update\_request';
- (g) 'weather\_service\_information\_request'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes:

- (a) 'parking\_lot\_charge\_details';
- (b) 'pollution\_state\_data';
- (c) 'toll\_price\_details';
- (d) 'transit\_fare\_details';
- (e) 'transit\_running\_data\_for\_demand';
- (f) 'transit\_services\_for\_demand';
- (g) 'traffic\_data\_for\_demand';
- (h) 'parking\_lot\_charge\_direct\_details';
- (i) 'toll\_price\_direct\_details';
- (j) 'transit\_fare\_direct\_details';
- (k) 'hri\_status\_for\_traffic\_demand'.

Unsolicited Output Processing: This process shall periodically generate the following output flows to other processes and functions within ITS and the local store of input data:

- (a) 'pollution\_state\_data\_request';
- (b) 'parking\_lot\_charge\_request';
- (c) 'toll\_price\_request';
- (d) 'transit\_conditions\_demand\_request';
- (e) 'transit\_services\_demand\_request';
- (f) 'traffic\_data\_demand\_request';
- (g) 'transit\_fare\_request';
- (h) 'transit\_fare\_direct\_request';
- (i) 'toll\_price\_direct\_request';
- (j) 'parking\_lot\_charge\_direct\_request'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'demand\_input\_data';
- (b) 'weather\_service\_information'.

Functional Requirements: This process shall:

- (a) run at locally determined intervals and generate the unsolicited outputs listed above, unless requested to run by the unsolicited input 'demand\_data\_update\_request';
- (b) when running, scan all the unsolicited inputs listed above and collect the data that they are currently providing;
- (c) when all inputs have been obtained, produce the solicited output shown above to load the collected data into the 'demand\_input\_data' store;
- (d) be capable of receiving the input data in a variety of formats and converting it into a single format suitable for use with the store of demand input data;

### **1.4.3 Update Demand Display Map Data**

Overview: This process shall provide updates to the store of map data used for displays of forecast traffic and travel demand produced by processes in the Manage Travel Demand facility of the Manage Traffic function. The process shall obtain the new data from a specialist map data supplier or some other appropriate source, on receiving an update request from the traffic operations personnel interface process within the Manage Travel Demand facility.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'request\_demand\_display\_update'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to external functions:  
(a) 'fmup-demand\_display\_update'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'tmup-request\_demand\_display\_update';  
(b) 'map\_data\_for\_demand\_display'.

Functional Requirements: This process shall:  
(a) continuously monitor for the receipt of the 'request\_demand\_display\_update' unsolicited data flow;  
(b) when the data flow in (a) is received, generate the 'tmup-request\_demand\_display\_update' solicited output data flow and continuously monitor for receipt of the 'fmup-demand\_display\_update' solicited input data flow;  
(c) when the flow in (b) is received, load the 'map\_data\_for\_demand\_display' data store;  
(d) be capable of receiving the input data in a variety of formats and converting it into a single format suitable for use with the store of map data;

#### **1.4.4 Implement Demand Management Policy**

Overview: This process shall implement the traffic and travel demand forecast data produced by the demand forecasting process in the Manage Travel Demand facility of the Manage Traffic function. The new demand forecast data shall be implemented in such a way that it can influence the demand from travelers for various types of services provided by ITS functions. The process shall when required, request changes to transit services, and/or the charges for tolls, and/or the use of parking lot spaces (as per the locally determined demand policy). It shall communicate the results of its policy implementation to the process that provides the interface to the traffic operations personnel.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'demand\_management\_activate'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval:  
(a) 'demand\_forecast\_data';  
(b) 'parking\_lot\_charge\_change\_response';  
(c) 'toll\_price\_changes\_response';  
(d) 'transit\_services\_changes\_response'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'ahs\_control\_data';  
(b) 'demand\_management\_result';  
(c) 'demand\_overrides';  
(d) 'parking\_lot\_charge\_change\_request';  
(e) 'toll\_price\_changes\_request';  
(f) 'transit\_services\_changes\_request'.

Functional Requirements: This process shall:  
(a) continuously monitor for receipt of the 'demand\_management\_activate' unsolicited data;  
(b) when the flow in (a) is received, send data to other Manage Traffic facilities and ITS functions using the solicited output data flows listed above;  
(c) be capable of interpreting the contents of the store of demand forecast data in a way that the outputs that are generated in (d) are readily understood by the receiving processes;  
(d) provide continuous feedback of the responses to the flows in (b) using the demand management result solicited output data flow.

### **1.4.5 Calculate Forecast Demand**

Overview: This process shall provide a forecast of traffic and travel demand in the geographic area served by the Manage Traffic function to which this instance of the Manage Travel Demand facility belongs. The process shall base its forecast on the current and predicted traffic levels traveler demand patterns obtained from an analysis of data obtained from elsewhere within the Manage Traffic function and from other ITS functions as well as locally determined demand policy. The process shall produce a demand forecast that changes the way that services are provided by ITS functions according to locally determined demand policy.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'demand\_forecast\_request'.

Solicited Input Processing: This process shall receive the following data flows as a result of requests for data retrieval:  
(a) 'demand\_input\_data';  
(b) 'demand\_policy\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'demand\_forecast\_data';  
(b) 'demand\_forecast\_result'.

Functional Requirements: This process shall:  
(a) continuously monitor for receipt of the 'demand\_forecast\_request' unsolicited data flow;  
(b) when the data flow in (a) is received, use appropriate algorithms to calculate future traffic and travel demand patterns across locally determined modes of transportation using the stores of demand input data and demand policy data;  
(c) provide results of the calculation of the new traffic and travel demand forecast in the demand forecast result data flow;

#### **1.6.1.1 Detect Roadway Events**

Overview: This process is responsible for monitoring local sensor data obtained from traffic surveillance and then determining and reporting the current state of all traffic in the HRI vicinity. The process provides triggers for other processes within Manage HRI Traffic Volume. It also monitors the device controls as they are initiated by the Activate HRI Device Controls process.

Functional Requirements: none.

#### **1.6.1.2. Control HRI Traffic Signals**

Overview: This process is responsible for interpreting the hri\_control message and safely directing the activation of the appropriate devices. This process will both directly command devices at the HRI and will disseminate necessary control information to the Process Indicator Output Data for Roads function to allow integrated control of adjacent traffic signals. Data will also be sent to SSR and/or HSR Device Control functions to control these specialized devices at the crossing. When sensor data indicates an approaching train this process notifies the Process Indicator Output Data for Roads function to allow the signal timing to be adjusted and dynamic message signs, if available, to be updated. This allows the traffic signals in the area adjacent to an HRI to be used to clear the Storage Area in advance of an approaching train and to manage traffic around the intersection.

Functional Requirements: none.

#### **1.6.1.2. Control HRI Warnings and Barriers**

Overview: This process is responsible for initiating the activation of HRI barriers at active vehicular and pedestrian grade crossings. When a request is sent to activate the HRI barriers perhaps because of a detection of an oncoming train, this process sends the device control signal to the Manage Device Controls process to activate the barriers. This process also returns state information to the Maintain Device State process concerning the commands that have been initiated by this process.

Functional Requirements: none.

#### **1.6.1.2. Provide SSR Device Controls**

Overview: This process is responsible for initiating the activation of HRI Standard Speed Rail control devices at active vehicular and pedestrian grade crossings. This process responds to requests sent by the Control HRI Traffic Signals process based on detection of an oncoming train. This process sends command information to the Manage Device Control containing control signals and commands that are unique to the SSR functions. State information is also sent to the Maintain Device State process to monitor the last known state of the controls commands being processed.

Functional Requirements: none.

#### **1.6.1.2. Provide HSR Device Controls**

Overview: This process is responsible for initiating the activation of HRI devices, barriers and other special safety features for High Speed Rail at active vehicular and pedestrian grade crossings. This process responds to requests sent by the Control HRI Traffic Signals process based on detection of an oncoming train. This process sends command information to the Manage Device Control containing control signals and commands that are unique to the HSR functions, such as trapped vehicle detection. State information is also sent to the Maintain Device State process to monitor the last known state of the controls commands being processed.

Functional Requirements: none.



#### **1.6.1.2. Manage Device Control**

Overview: This process is responsible for managing and selecting the appropriate device control messages. This process gathers the control signals from the other Activate HRI Device Control processes and forwards them as needed to the Process Indicator Output Data for Roads process within Provide Device Control. These control signals are used to activate all of the HRI unique roadside devices such as gates or other barriers, lights, adjacent traffic signals, message signs or in-vehicle signage beacons.

Functional Requirements: none.

#### **1.6.1.2. Maintain Device State**

Overview: This process is responsible for managing and selecting the appropriate device control state messages. This process collects the device state messages that are produced by the other Activate HRI Device Controls processes and forwards the appropriate signals to the Detect Roadway Events process that monitors the status of the HRI commands being processed. This information is also used in the equipment diagnostic monitoring and testing.

Functional Requirements: none.

#### **1.6.1.3 Perform Equipment Self-Test**

Overview: This process is responsible for performing real-time equipment checks and reporting the status of the equipment associated with an active grade crossing. Based on receipt of the sensor data of the surrounding highway and rail traffic and receipt of any near term events this process can execute a real-time check of the equipment and determine the relative health and status of the active grade crossing equipment. The output is sent onto the Monitor HRI Status process for further processing with other diagnostic data.

Functional Requirements: none.

#### **1.6.1.4. Generate Alerts and Advisories**

Overview: This process is responsible for generating the messages to advise and protect motorists, travelers and train crews approaching and crossing railroad grade crossings. Based on the severity of the hazard condition sent by the Detect HRI Hazards process this process will either send an hri\_advisory command for non-time critical data or an hri\_alert command for time critical data to the Report Alerts and Advisories. These users that will receive these messages include drivers, bicyclists, and pedestrians.

Functional Requirements: none.

#### **1.6.1.4. Provide Closure Parameters**

Overview: This process is responsible for providing the HRI predicted time to closure to be used in broadcast message alerts to approaching vehicles. This time is calculated from data provided by the Detect HRI Hazards process.

Functional Requirements: none.

#### **1.6.1.4. Report Alerts and Advisories**

Overview: This process is responsible for reporting real-time HRI traffic volume advisories and real-time highway traffic alerts. Depending on the input received from the Generate Alerts and Advisories process, this process sends alerts or advisories to a train to describe the operational status of the intersection and alerts about any hazards. This process also sends the commands to Output Control Data for Roads process that will control the dynamic message signs in the area of an HRI to display the appropriate alert or advisory. Messages for local beacon broadcast are processed and sent to the Report HRI Status on Approach process.

Functional Requirements: none.

#### **1.6.1.4. Report HRI Status on Approach**

Overview: This process is responsible for providing real-time HRI status to vehicles as they approach an HRI. It must discriminate between vehicles near, but not approaching, the HRI (e.g. on parallel side streets, etc.). This process develops the message to be broadcast to nearby vehicles by receiving time\_to\_closing data and the hazard\_condition signal and calculating the appropriate window of time to display the message. The message is built from the approach\_warning data received from the Report Alerts and Advisories process.

Functional Requirements: none.

#### **1.6.1.5 Detect HRI Hazards**

Overview: This process is responsible for detecting real-time HRI blockages or collisions in the vicinity of an HRI that create a blockage or other hazard at the HRI. Based upon information received from the Provide Advance Warnings process this process can send a request to the Control Traffic Volume at Active HRI that the local signal strategy be preempted. A hazard condition message can also be sent to the Generate Alerts and Advisories process for further action or the Provide Closures Parameters process to possibly adjust the time to closing.

Functional Requirements: none.

#### **1.6.1.6. Close HRI on Detection**

Overview: This process is responsible for protecting highway vehicles approaching and crossing railroad grade crossings by initiating the closure up to 3 minutes before train arrival. This process receives the near term status of the crossing including any approaching trains or trapped vehicles. With this information along with the local control plan data the predicted HRI state is computed and sent to the Detect Imminent Vehicle/Train Collision process. If a HRI\_predicted\_collision message is returned then this process sends out an hri\_hazard message to the Detect HRI Hazard which will in turn result in a change to the device control strategy. This process also receives rail operations advisories for processing along with the state and control plan data. As needed this process will output any rail\_operations\_message data to the Interact with Rail Operations process.

Functional Requirements: none.

#### **1.6.1.6. Detect Imminent Vehicle/Train Collision**

Overview: This process is responsible for detecting imminent collisions between vehicles and trains at railroad grade crossings. Using the data contained in the predicted\_hri\_state message this process performs the necessary calculations to determine whether a collision is imminent. If so, this process returns a hri\_predicted\_collision message to the Close\_HRI\_on\_Detection process.

Functional Requirements: none.

#### **1.6.1.7. Control Traffic Volume at Active HRI**

Overview: This process is responsible for controlling vehicular traffic at an active HRI by controlling the operation of traffic control devices in accordance with a predetermined local control plan. The local control plan is communicated to the Close HRI on Detection process. This local control plan can be preempted by a strategy preemption message from the Detect HRI Hazards process or by such inputs as an event notice from the Detect Roadway Events process or HRI traffic surveillance data. The outputs of this process include the command messages to close the HRI, requests for information from the Manage Traffic function, and information about the current HRI traffic data.

Functional Requirements: none.

#### **1.6.1.7. Close HRI on Command**

Overview: This process is responsible for closing the HRI to vehicular traffic, either on command from the Control Traffic Volume at Active HRI process, or from direct command from rail operations (as an override). Upon receipt of the inputs to close the HRI or from rail operations this process shall send an HRI control message to close the intersection.

Functional Requirements: none.

### **1.6.2.1 Exchange Data with Rail Operations**

Overview: This process is responsible for exchanging routine data with rail operations. Such data being sent to the rail operators includes event schedules, requests for information from the Rail Operators, incident notification based on rail operations messages received from Close\_HRI\_on\_Detection process and hri\_priority\_message data received from the Manage Alerts and Advisories process. This process receives maintenance schedules, train schedules, and incident notifications from the rail operators. This information is used to develop the rail operations update data that is passed onto the Manage Rail Traffic Control Data process and the rail operations priority data that is sent to the Manage Alerts and Advisories process.

Functional Requirements: none.

### **1.6.2.2 Manage Alerts and Advisories**

Overview: This process is responsible for acquiring HRI advisory or alert data from rail operations and for providing HRI status to rail operations. The data managed by this process may be time critical, as in the case of alerts or priority messages, or not time critical, as in the case of advisories.

Functional Requirements: none.

### **1.6.2.3 Manage Rail Traffic Control Data**

Overview: This process is responsible for providing and maintaining a current store of rail operations data. The data is assembled from the rail\_operations\_update information sent by the Exchange Data with Rail Operations process. Queries for this information are received from the Manage Alerts and Advisories process and the Interact with Traffic Volume Management processes.

Functional Requirements: none.

### **1.6.3.1 Interact with Wayside Systems**

Overview: This process is responsible for interfacing to railroad owned and maintained wayside equipment, such as Wayside Interface Units, Crossing Gate Controllers, etc. All these devices are expected to provide real-time information to the HRI about approaching trains and their own health. In addition, advanced implementations will make use of a communications path back to approaching trains provided by the railroad's equipment.

Functional Requirements: none.

### **1.6.3.2 Advise and Protect Train Crews**

Overview: This process is responsible for generating advisories/ alerts that are routed to the wayside equipment for transmission to the train crews. If the intersection is blocked, or there is an incident at the intersection this information will be passed to the Interact with Wayside Systems process for routing to the wayside equipment. The wayside equipment can then route the information directly to the train crews, or to rail operations.

Functional Requirements: none.

### **1.6.3.3 Provide ATS Alerts**

Overview: This process is responsible for automatically protecting commuter, intercity, transit and freight trains as they approach and cross grade crossings. It also reports HRI rail traffic advisories to traffic management and rail operations. It is responsible for verifying and reporting overall HRI status to approaching trains so that crews can act within safe service braking distances. It provides for notification of Automatic Train Stop systems (ATS, PTS, etc) with sufficient advance warning to allow emergency brake application time to stop a train before it encounters an HRI hazard. Finally, it provides automatic status indications about the HRI to the crews of approaching trains.

Functional Requirements: none.

### **1.6.4.1 Manage HRI Closures**

Overview: This process is responsible for coordination and managing of HRI closures at the Traffic management Center. It interfaces with Manage Incidents process to provide incident information and to receive strategy overrides as required by the larger incident management function.

Functional Requirements: none.

### **1.6.4.2 Exchange Data with Traffic Management**

Overview: This process is responsible for interacting with traffic management processes. It collects data from processes that are within the HRI elements located at the roadside and forwards the data as needed to other processes within traffic management. It also acts as the interface between rail operations and traffic management processes through its interface with the Interact with Rail Operations process.

Functional Requirements: none.

### **1.6.5.1 Provide Interactive Interface**

Overview: This process is responsible for initiating reports of the health status of the HRI to both Traffic Management and Rail Operations. In addition the process initiates reporting of the health status of the HRI to the wayside interface equipment (and ultimately to the train when the advanced HRI functionality is in place).

Functional Requirements: none.

### **1.6.5.2 Determine HRI Status**

Overview: This process is responsible for monitoring critical HRI functions and merging them into a single coherent picture of the state of the HRI. It also is responsible for assuring that the HRI always reverts to the safest possible operating condition in the event of any operational malfunctions.

Functional Requirements: none.

### **1.6.5.3 Maintain HRI Closure Data**

Overview: This process is responsible for managing a log of the HRI operation for use in strategy planning, demand management and traffic management.

Functional Requirements: none.

### **3.1.2 Carry-out Safety Analysis**

Overview: This process shall be responsible for producing safety warnings for display to the driver and output to the vehicle control processes. The process shall base its output on input from another process in the vehicle that is analyzing inputs to sensors. When data about a safety situation is received, the process shall output the appropriate messages to another process in the vehicle to warn the driver. If the vehicle is so equipped, the process shall send data to the process in the vehicle responsible for its control.

Data Flows: The input data flow is unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flow listed above;
- (b) when the input is received, generate the outputs identified above;
- (c) the time to produce the outputs must be consistent with the safe operation of vehicle control systems with human interfaces regardless of the number of time the input is received;
- (d) only send the data to the vehicle control processes if the input shows that there is a safety problems with the driver or the vehicle;
- (e) the content of the safety warning message shall be tailored to reflect the data input received.

### **3.3.1 Provide Communications Function**

Overview: This process shall be responsible for sending messages it receives from other processes in this facility to the Manage Emergency Services function. It shall also be responsible for passing on the resulting response to the driver via processes in the Provide Driver and Traveler Services function. This process is also capable of receiving requests for additional data from the Manage Emergency Services function and transmitting follow-up details. This process can also receive commands related to the vehicle's security system from the Manage Emergency Services function and forward the commands to the vehicle's security system.

Data Flows: All input data flows are unsolicited except the following:

- (a) vehicle\_security\_system\_commands.

All output data flows are solicited except the following;

- (a) vehicle\_security\_system\_commands\_request.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the vehicle emergency request flow listed above;
- (b) when the input in (a) is received, immediately generate the output to the Manage Emergency Services function identified above;
- (c) when a response is received to the output in (b) send the data flow to the Provide Driver and Traveler Services function so that a message can be output to the driver;
- (d) the processing of the sensor input and generation of the output shall be completed within a time frame consistent with the safe operation of vehicle control systems regardless of the number of inputs and the amount of processing needed to produce a digital output that can be used by other processes.

#### **4.1.1 Process Transit Vehicle Sensor Data**

Overview: This process shall collect and process data available to sensors on-board transit vehicles. This data includes on-board data (such as the status of on-board systems), collected trip data, and environmental probe data. This data shall be sent by this process to other processes on-board the transit vehicle and elsewhere in the Manage Transit function for use in determining vehicle schedule deviations and for storage as operations data.

Data Flows: The input data flow is unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the input is received, generate the outputs identified above.

#### **4.1.2.1 Determine Transit Vehicle Deviation and ETA**

Overview: This process shall determine the schedule deviation and estimated times of arrival (ETA) at transit stops of a transit vehicle. The data shall be sent by this process to other processes in the Manage Transit function for use in calculating corrective instructions for output to the transit vehicle drivers, for use in calculation of a much wider return to schedule strategy where more than one vehicle and/or service is involved. This process shall also send the data to the transit driver interface process, so that the driver is aware of the actual schedule deviation. This output shall be set to zero (no deviation) when that condition occurs, even when it has followed a period of deviation from schedule.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, generate the outputs identified above using the methods described below and with the exceptions noted below;
- (c) generate the schedule deviation using the current service details (routes and schedules) and the vehicle's current location using interpolation or some other algorithmic method;
- (d) use similar methods to generate the transit vehicle's estimated time of arrival at the next transit stop for output to the stop as the vehicle approaches;
- (e) only if the deviation is small and in an urban area the process shall send the data to the process that generates corrective instructions;
- (f) if the deviation is large or not in an urban area, the process shall not produce the output identified in (e) above and shall instead just send the data to the process that manages transit vehicle deviations;
- (g) the process shall generate outputs even when the deviation is zero.

#### **4.1.2.2 Determine Transit Vehicle Corrective Instructions**

Overview: This process shall generate outputs that enable a transit vehicle schedule deviation to be corrected. The process shall derive its outputs from data received from other processes in the Manage Transit function. The outputs produced by the process shall consist of corrective instructions for output to the transit vehicle driver by a process on-board the vehicle, and priority requests for traffic signal controllers at intersections. The process shall only produce this output when another process has determined that deviation is small, or the transit vehicle is operating in an urban area. In all other conditions, the process shall provide an output that shows that there are no corrective instructions.

Data Flows: The input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the input flow of transit vehicle deviations is received, generate the outputs identified above using any appropriate algorithms for determining the corrective instruction data for the transit vehicle driver.

#### **4.1.2.3 Provide Transit Vehicle Driver Interface**

Overview: This process shall provide a schedule correction interface for the transit driver in the transit vehicle. The interface shall provide data to the driver about how far the vehicle is from its schedule and what corrective action the driver must take. The data shall be received by the process from other processes in the Manage Traffic function. The output delivered by the process shall be available in audio or visual form in such way that while alerting the driver to the information it contains, it shall in no way impair the driver's ability to operate the vehicle in a manner that is both safe to its passengers and to other vehicles on the roads and freeways. The process shall maintain the output until new data is received from the other processes.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'transit\_vehicle\_corrective\_instructions';
- (b) 'transit\_vehicle\_deviation\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'ttd-corrective\_instructions';
- (b) 'ttd-transit\_vehicle\_schedule\_deviations'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) the output shall be presented in such a way that it provides the necessary information without jeopardizing the driver's ability to operate the vehicle safely, both for its passengers and for other vehicles on the roads and freeways;
- (c) the output shall be maintained until fresh data is received through the unsolicited input flows listed above.



#### **4.1.2.4 Provide Transit Vehicle Correction Data Output Interface**

Overview: This process shall provide the interface through which multimodal transportation service providers are informed of a transit vehicle schedule deviation. The output delivered by the process results from input received from other processes in the Manage Transit function, and shall relate to the deviation of an individual transit vehicle. The process shall provide the output in a form that enables adjustments to be made to any connecting services being provided by the multimodal supplier so that transit users are not inconvenienced by the deviation of a transit vehicle on one service. A zero (or null) output shall be provided when no deviations are present.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'transit\_vehicle\_arrival\_conditions'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'tmtsp-transit\_arrival\_changes'.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor for receipt of the unsolicited input flows listed above;  
(b) provide the solicited output flow listed above in a form that will enable the multimodal service provider to take any remedial action to the service it provides so that transit users suffer the minimum of inconvenience as a result of a late running service;  
(c) if no input is received, or it shows that there are no deviations, set the output to zero (or null) to reflect this condition.

#### **4.1.2.5 Request Transit Vehicle Priorities**

Overview: This process shall provide the interface through which requests for priority can be output from a transit vehicle. The output shall be received by the process as a result of data sent from another process in the Manage Transit function. The process shall provide the output in a form that can be used by the controllers at intersections, pedestrian crossings, and multimodal crossings on the roads (surface streets) and freeway (ramp controls) network served by the Manage Traffic function to provide priority of the transit vehicle. If no data is received from the other process, or it shows that no priority is needed, the process shall produce no output.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'transit\_vehicle\_priority\_request'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'transit\_vehicle\_roadway\_priorities'.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor for receipt of the unsolicited input flow listed above;  
(b) when the flow listed above is received, produce the solicited output flow listed above in a form that can be used by roadside intersection controllers to give priority to the transit vehicle;  
(c) if no input flow is received, or it indicates that priority is not required, produce no output data flow.

#### **4.1.3 Provide Transit Vehicle Location Data**

Overview: This process shall provide the transit vehicle's current location with a high degree of accuracy. The location shall be computed by this process from data sent by other processes that provides basic vehicle location and on-board vehicle conditions, such as proximity to transit stop, vehicle doors opened or closed, etc. The data shall be output continuously by the process and sent to other processes for their use and for storage.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when any of the inputs are received, generate the outputs identified above by combining the new data with the last output values;
- (c) the calculation of the new location shall use the basic location data and refine it by use of data from on-board the vehicle, e.g. proximity of transit stop, vehicle doors open, etc.

#### **4.1.4 Manage Transit Vehicle Deviations**

Overview: This process shall manage large deviations of individual transit vehicles, deviations in rural areas, and deviations of large numbers of vehicles. The process shall generate the necessary corrective actions which may involve more than the vehicles concerned and more far reaching action, such as, the introduction of extra vehicles, wide area signal priority by the Manage Traffic function, the premature termination of some services, etc. In addition, this process will receive roadway maintenance status and work plan information from the Manage Maintenance and Construction function, and shall respond to that function with feedback regarding the work plan. All corrective actions generated by this process shall be subject to the approval of the transit fleet manager before being implemented. Confirmation that the requested overall priority has been given by the Manage Traffic function shall be received by the process.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the input of deviation from schedule is received use the current transit services and the forecast of traffic conditions provided by the data in the flow of predictive data received from the Manage Traffic function as input to algorithms that can produce a return to service strategy;
- (c) when the process in (b) is complete, send the strategy to the transit fleet manager for approval;
- (d) when the approval in (c) is received, send the remaining output flows, and await confirmation of the implementation of the requested priority by the Manage Traffic function;
- (e) if the confirmation on (d) is not given, then re-implement (b) through (d) using the fact that priority requests to the Manage Traffic function are not available.

#### **4.1.5 Provide Transit Vehicle Status Information**

Overview: This process shall provide transit vehicle operational data to processes within the Manage Transit function, and on request to the transit fleet manager and the Manage Travel Demand facility in the Manage Traffic function. This process shall also provide transit probe and AVL information to the Manage Traffic function. Transit probe information can be provided by fixed route, flexibly routed, and paratransit services. The data shall be obtained by this process from another process that manages a store of transit vehicle operating data.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) at regular periodic intervals, send the request for transit information;
- (c) when the data in (b) is received, send out the data flows listed above that do not have any corresponding data request flow;
- (d) when any other input listed above is received, output the flow requesting transit vehicle information and send the response back to the originating process.

#### **4.1.6 Manage Transit Vehicle Operations Data**

Overview: This process shall manage transit vehicle operations data. The data is collected from processes in transit vehicles and from other processes within the Manage Transit function. The process shall manage a store of transit vehicle operating data. When any new data is received from another process, this process shall load it into the data store. This process shall also retrieve selected data on request from other processes in the Manage Transit function and from the Surface Transportation Weather Service terminator. This data will then be sent on to another process within the Manage Transit function to manage transit vehicle schedule deviations. This process will receive road weather information, asset restriction data, and work zone information from the Manage Maintenance and Construction function and weather information from the Weather Service terminator. In addition, this process will send environmental probe data obtained from sensor measurements on transit vehicles to the Manage Maintenance and Construction function.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following:

- (a) 'transit\_vehicle\_operating\_data', which contains data requested from and written to a data store;
- (b) 'traffic\_incident\_data\_for\_transit', which is sent to the process that manages the interface to Other TRM.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs that are not data requests are received, load the data that they contain into the data store using the flow identified above and generate the update and transit vehicle information output flows identified above;
- (c) periodically generate requests for data collected by sensors on-board the vehicle and store the solicited data when received;
- (d) when inputs that are data requests are received, retrieve the data and only send it to the source of the request;
- (e) when 'traffic\_data\_for\_transit' is received, send 'traffic\_incident\_data\_for\_transit' to the process that manages the interface to Other TRM;
- (f) the transit user data flow that is sent to each transit stop shall be sent as each transit vehicle approaches a stop to provide information for output to transit users at the stop;
- (g) be responsible for the management of the data in the store of transit vehicle operational data.

#### **4.1.7 Provide Transit Vehicle Deviation Data Output Interface**

Overview: This process shall provide the interface through which multimodal transportation service providers are informed of transit vehicle schedule deviations. The output delivered by the process shall result from input received from another process in the Manage Transit function, and shall relate to the deviation of a number of transit vehicles such that the disruption will affect several services, possibly on different routes. The process shall provide the output in a form that enables adjustments to be made to any connecting services being provided by the multimodal supplier so that transit users are not inconvenienced by the deviations. A zero (or null) output shall be provided when no deviations are present.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'transit\_vehicle\_arrival\_deviations'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'tmtsp-transit\_arrival\_deviations'.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor for receipt of the unsolicited input flows listed above;  
(b) provide the solicited output flow listed above in a form that will enable the multimodal service provide to take any remedial action to the service it provides so that transit users suffer the minimum of inconvenience as a result of a late running service;  
(c) if no input is received, or it shows that there are no deviations, set the output to zero (or null) to reflect this condition.

#### **4.1.8 Provide Transit Operations Data Distribution Interface**

Overview: This process shall provide customized sets of transit vehicle schedule deviations to travelers, the traveler information data archive, and to the media. The process shall only provide data to the media and data archive when prompted by the arrival of new deviation data in the transit\_vehicle\_operational\_data store, which is maintained by another process in the Manage Transit function. The outputs shall be made available following a direct request from the other ITS function, or as part of a subscription process relating to a traveler's transit profile. The process shall obtain the required data from the process that manages the store of transit vehicle operating data. The process shall send kiosk and personal transit deviation requests to the archival process.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'transit\_conditions\_advisories\_request';
- (b) 'transit\_conditions\_guidance\_request';
- (c) 'transit\_deviation\_data\_received';
- (d) 'transit\_deviation\_kiosk\_request';
- (e) 'transit\_deviations\_personal\_request';
- (f) 'fws-predicted\_weather';
- (g) 'fws-current\_weather'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes:

- (a) 'transit\_vehicle\_deviations\_details'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'tm-transit\_schedule\_variations';
- (b) 'transit\_running\_data\_for\_advisory\_output';
- (c) 'transit\_running\_data\_for\_guidance';
- (d) 'transit\_vehicle\_deviations\_details\_request';
- (e) 'transit\_deviations\_for\_kiosks';
- (f) 'transit\_deviations\_for\_personal\_devices';
- (g) 'transit\_deviation\_kiosk\_request\_for\_archive';
- (h) 'transit\_deviations\_personal\_request\_for\_archive';
- (i) 'transit\_deviations\_for\_broadcast\_to\_kiosks';
- (j) 'transit\_deviations\_for\_broadcast\_to\_personal\_devices'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) generate the transit deviations details message and output a copy of the deviations requests to the archive when any of the inputs are received and return the data received in the solicited input flow to the source(s) of the input(s);
- (c) only provide output to the media when the unsolicited input, transit (vehicle) deviation data received, is received and the data provided by the solicited input flow has also been received.

#### **4.1.9 Process Transit Vehicle Sensor Maintenance Data**

Overview: This process shall collect and process vehicle maintenance data available to sensors on-board transit vehicles. When processed, the data shall be sent by this process on request to another process in the Manage Transit function for storage as transit vehicle operating data so that it can subsequently be used for work on future vehicle maintenance.

Data Flows: The input data flows are unsolicited and the output flow is solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input data flows listed above;
- (b) when the vehicle maintenance data flow is received, process it and if required translate it into a digital form;
- (c) when the request for transit vehicle collected maintenance data is received, generate the output data flow identified above.

#### **4.2.1.1 Process Demand Responsive Transit Trip Request**

Overview: This process shall provide the interface through which processes in the Provide Driver and Traveler Service function can gain access to the Provide Demand Responsive Transit Service facility. The process shall enable the interface to support the receipt of trip requests, their transfer to another process for the actual demand responsive schedule generation, the output of the proposed schedule and their (possible) subsequent confirmation. The process shall store the input and schedule data relating to each request until such time as the request is confirmed or the data in the request is no longer valid, e.g. the time(s) used in the proposed schedule has(ve) passed. The confirmation of a particular schedule shall be sent by the process to another process that will enable the schedule to be implemented.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following which contains data requested from and written to the store of request data:

- (a) 'paratransit\_service\_data'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the flow in (a) is a new schedule request, generate the corresponding output identified above and send it to the schedule generation process;
- (c) as a result of (b) continuously monitor for the receipt of the flow listed above containing details of the proposed schedule;
- (d) when the flow in (c) is received, load the data into the store of paratransit service data, including an identity number with it;
- (e) when (d) is successfully complete, generate the output listed above that contains the details of the proposed service for use by the requesting process;
- (f) when the flow in (a) is a schedule confirmation, read the schedule data corresponding to the identity number and generate the output to the schedule confirmation process identified above;
- (g) manage the data in the store of trip request data.

#### **4.2.1.2 Compute Demand Responsive Transit Vehicle Availability**

Overview: This process shall provide the facility for the calculation of the location and availability of transit vehicles for use in demand responsive transit operations. The process shall base its calculation on the vehicle's current location and on the output from a process that determines vehicle availability from data input to sensors. The output shall be loaded by the process into a store for use by another process.

Data Flows: All input data flows are unsolicited and the output flow shall be sent to the store of available transit vehicles using the flow 'paratransit\_available\_vehicles'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, generate the output identified above;
- (c) manage the data in the store of transit vehicle availability.

#### **4.2.1.3 Generate Demand Responsive Transit Schedule and Routes**

Overview: This process shall provide dynamic routing and scheduling of transit vehicles so that a demand responsive transit service can be provided. The generation of the specific route and schedule by the process shall be initiated by a request from another process. The choice of route and schedule produced by the process shall depend on what other demand responsive transit schedules have been planned, the availability and location of vehicles, the relevance of any fixed transit routes and schedules, and road network information. The process shall load its output into a data store for use if the schedule is later confirmed. Traffic incident data shall be received from the Manage Traffic function and sent on to the process that manages the interface to other transit management centers.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following:

- (a) 'paratransit\_services', which contains data requested from and written to a data store;
- (b) 'paratransit\_available\_vehicles', which also contains data requested from a data store;
- (c) 'transit\_services\_for\_demand\_response', which is received as a result of output being sent to another process.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, generate the outputs identified above using an appropriate routes and schedule generation algorithm;
- (c) manage the data in the paratransit services data store, including generated routes and schedules;
- (d) use appropriate database mechanism(s) to retrieve data from the store of available transit vehicles identified above.

#### **4.2.1.4 Confirm Demand Responsive Transit Schedule and Route**

Overview: This process shall provide output when a demand responsive transit schedule is confirmed. The outputs shall contain details of the schedule and shall be sent to the transit fleet manager and to processes that provide interfaces to the transit driver, a store of data used by the regular transit routes and schedule generation processes, and the transit driver schedule generation processes. The process shall obtain the data for the outputs from the store of data provided by the schedule generation process.

Data Flows: The input data flow is unsolicited and all output flows are solicited with the exception of the following which contains data requested from a data store:

(a) 'paratransit\_services'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flow listed above;
- (b) when the input is received, generate the outputs identified above;
- (c) manage the data in the store of paratransit services.

#### **4.2.1.5 Process Demand Responsive Transit Vehicle Availability Data**

Overview: This process shall manage data input to sensor(s) on board a transit vehicle. Data including the vehicle's availability for use in demand responsive transit services shall be provided by this process to other processes within the Manage Transit function.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flow:

(a) 'fbtv-availability'.

Solicited Output Processing: This process shall provide the following output flow as a result of the above inputs being received:

(a) 'paratransit\_transit\_vehicle\_availability'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flow shown above;
- (b) analyze the input flow and if required, transform it into digital data for use by other processes;
- (c) send the data in the solicited output flow shown above to the process that will combine it with vehicle location.



#### **4.2.1.6 Provide Demand Responsive Transit Driver Interface**

Overview: This process shall provide the interface through which a transit driver will be sent instructions about the demand responsive transit schedule that has been confirmed. The process shall send the data in a format that will enable the driver to implement the schedule. The output provided by the process shall be available in audio or visual form in such a way that while alerting the driver to the information it contains, it shall in no way impair the driver's ability to operate the vehicle in a manner that is both safe to its passengers, and to other vehicles on the roads and freeways. The input and output forms shall also include those that are suitable for travelers with physical disabilities.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flow:  
(a) 'paratransit\_transit\_driver\_instructions'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'ttd-paratransit\_information'.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor for receipt of the unsolicited input flows listed above;  
(b) produce the output to the transit driver in such a way that it does not jeopardize the driver's safe operation of the transit vehicle, but conveys the required information in an easily understandable form;  
(c) maintain the output for as long as the schedule is current, i.e. until the time of the last activity or the last arrival time has past.

#### **4.2.2 Provide Transit Plans Store Interface**

Overview: This process shall provide the interface to the store of current regular transit plans, i.e., routes and schedules and demand responsive transit schedules. The process shall enable the store to be used by the Demand Responsive Transit facility as a source of data about regular transit services when it is generating its schedules. The demand responsive transit schedule data shall be accessible as input to the regular transit route and schedule generation processes.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following which contains data requested from and written to the store of transit plans:  
(a) 'transit\_plans'.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor for receipt of the input flows listed above;  
(b) when the inputs are received, generate the outputs identified above;  
(c) manage the data in the store of transit plans data.

#### **4.2.3.1 Generate Transit Routes**

Overview: This process shall generate new transit routes. The process shall use parameters set up by the transit fleet manager, operational data for the current routes and schedules, plus the current routes and digitized map data, as sources of input from which the new routes are generated. The process shall also use the requested input data containing the demand responsive transit routes and schedules. The generation of new routes by the process shall be initiated as a result of data received from the transit fleet manager interface process, with the output being sent to other processes for storage. The output data produced by the process shall include sufficient data for a specialist map data provider to generate maps showing transit routes and stops, either as separate data or as part of the general digitized map data provided to other ITS functions.

Data Flows: The input data flow for updating routes and services is unsolicited and all other input and output flows are then solicited as a result of its receipt. The following data flows are received as a result of requests for data from stores:

- (a) 'map\_data\_for\_transit';
- (b) 'transit\_operational\_data';
- (c) 'transit\_service\_planning\_parameters'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flow requesting update of the routes and services from the transit fleet manager and shown in the list above;
- (b) when this input is received, initiate the generation process, reading in all the required data from stores, or requesting it from the store interface process;
- (c) use the data in (b) to produce the output of new transit routes data using an appropriate route generation algorithm;
- (d) use appropriate database mechanism(s) to retrieve data from the stores identified by the flows shown above.

#### **4.2.3.2 Generate Transit Schedules**

Overview: This process shall generate new transit schedules for use by the regular transit operation. The process shall use parameters set up by the transit fleet manager, operational data for the current routes and schedules, plus the current routes and schedules themselves, as sources of input from which the new schedules are generated. The process shall also use the data containing the demand responsive transit routes and schedules to generate the new schedules. The generation of new schedules by the process shall be initiated as a result of data received from the transit fleet manager interface process or a request for services to a parking lot. The process shall send its output to another process for storage.

Data Flows: The input data flow for updating routes and services is unsolicited and all other input and output flows are then solicited as a result of its receipt. The following data flows are as a result of requests for data from stores:

- (a) 'transit\_operational\_data';
- (b) 'transit\_service\_planning\_parameters'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flow requesting update of the schedules shown in the list above;
- (b) when this input is received, initiate the generation process, reading in all the required data and produce the output of the new transit schedules data using an appropriate schedule generation algorithm;
- (c) use appropriate database mechanism(s) to retrieve data from the stores identified by the flows shown above.

#### **4.2.3.3 Produce Transit Service Data for External Use**

Overview: This process shall obtain transit routes and services data and distribute it to ITS functions that are outside the transit center. The process shall run when a request for data is received from an external source, or when fresh data is received. Data requests shall not be supported for travelers in a transit vehicle or the Multimodal Transportation Service Provider. For data requests that include an origin and a destination, the process shall only provide details of the transit service(s) that link the two points. The details shall only cover those portion(s) of the service(s) that are needed to complete the requested trip and not full details of the services.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'transit\_services\_advisories\_request';
- (b) 'transit\_services\_demand\_request';
- (c) 'transit\_services\_guidance\_request';
- (d) 'transit\_services\_kiosk\_request';
- (e) 'transit\_services\_travelers\_request';
- (f) 'transit\_services\_personal\_request'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to another process:

- (a) 'transit\_service\_external\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'request\_transit\_service\_external\_data';
- (b) 'tmtsp-transit\_service\_data';
- (c) 'transit\_services\_for\_advisory\_data';
- (d) 'transit\_services\_for\_demand';
- (e) 'transit\_services\_for\_deployment';
- (f) 'transit\_services\_for\_guidance';
- (g) 'transit\_services\_for\_kiosks';
- (h) 'transit\_services\_for\_travelers';
- (i) 'transit\_services\_for\_personal\_devices';
- (j) 'traveler\_transit\_information';
- (k) 'traveler\_transit\_information\_for\_transit\_advisories'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when any of the unsolicited inputs shown above except the last are received, the process shall immediately generate the first solicited output shown above;
- (c) when the solicited input flow is received as a result of (b) begin generation of the requested data, only including the details necessary to meet the request, i.e., all of the transit routes and schedules provided in response to every request;
- (d) data shall only be sent to the source from which the data request originated;
- (e) before output, the process shall put the data into a format that is easily read and interpreted by external processes and can also be read by travelers and transit users with the minimum of further processing;
- (f) if the second unsolicited input is received, i.e., fresh service data is received without being requested, the data shall only be sent to the multimodal transportation service provider using the second solicited output flow.

#### **4.2.3.4 Provide Transit Fleet Manager Interface for Services Generation**

Overview: This process shall provide the interface through which the transit fleet manager controls the generation of new routes and schedules (transit services). The transit fleet manager shall be able to review and update the parameters used by the routes and schedules generation processes and to initiate these processes. This process shall also act as the interface through which the Manage Demand facility in the Manage Traffic function can request changes to the current routes and schedules in its efforts to adjust the modal split of travelers' trips in order to make the most efficient use of the road and highway network served by the local ITS functions. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following which contains data written to a data store:

(a) 'transit\_service\_planning\_parameters'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows from the transit fleet manager listed above;
- (b) when the inputs in (a) are received, generate the appropriate outputs identified above;
- (c) continuously monitor for receipt of any input data flows that may be produced by the output flows generated in (b);
- (d) use appropriate database mechanism(s) to write data to the store of transit service planning parameters, the flow identified above when input of new/updated parameters is received from the transit fleet manager;
- (e) the process shall allow the schedule generation process to be initiated on its own, but shall always initiate that process if initiation of the routes generation process is requested. I.e. it shall not be possible to have old schedules applied to newly generated routes.

#### **4.2.3.5 Manage Transit Operational Data Store**

Overview: This process shall collect transit operational data and load it into a data store for use by the routes and schedules generation processes. The data shall be provided to this process by other processes in the Manage Transit function and shall enable an accurate picture of how routes and schedules are currently operating in terms of the numbers of vehicles that are available, the numbers of passengers that they are carrying, and the numbers of passengers passing through each roadside facility (transit stop).

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'transit\_roadside\_passenger\_data';
- (b) 'transit\_vehicle\_passenger\_data';
- (c) 'transit\_vehicle\_availability';
- (d) 'transit\_vehicle\_data'.

Solicited Input Processing: This process shall receive the following input flow as a result of data being sent to the transit fleet manager terminator:

- (a) 'ftfm-passenger\_loading\_updates'.

The remaining data flows are solicited output flows.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when any of the inputs is received, write the data into the store of operational data using the output flow shown above;
- (c) when writing the data to the store, rationalize the two counts of the numbers of passengers for each transit route segment, (one being reported by the fare collection process and the other by the transit vehicle monitoring process), reporting any differences to the transit fleet manager;
- (d) periodically, read the data from the transit operational data store and send it to the archive function using the solicited flow shown above;
- (e) manage the data in the store of transit operational data.

#### **4.2.3.6 Produce Transit Service Data for Manage Transit Use**

Overview: This process shall obtain transit routes and services data and distribute it internally to other processes in the Manage Transit function. The process shall only provide its outputs when fresh data is received from another process. If this does not happen for a long period of time (days), then the process shall initiate its own request for fresh data.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'transit\_service\_internal\_data';  
(b) 'transit\_services\_for\_eta\_request'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to another process:  
(a) 'transit\_service\_internal\_data'.

Unsolicited Output Processing: This process shall provide the following output flows regardless of any inputs that are received:  
(a) 'request\_transit\_service\_internal\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'transit\_services\_for\_corrections';  
(b) 'transit\_services\_for\_eta';  
(c) 'transit\_services\_for\_advanced\_fares';  
(d) 'transit\_services\_for\_vehicle\_fares';  
(e) 'transit\_services\_for\_roadside\_fares';  
(f) 'transit\_services\_for\_scenarios';  
(g) 'transit\_services\_for\_transit\_drivers'.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor for receipt of the unsolicited input flows listed above;  
(b) when the unsolicited input shown above is received, the process shall immediately generate all of the solicited outputs shown above;  
(c) if the first unsolicited input is not received periodically, then the process shall generate the unsolicited output shown above.

#### **4.2.3.7 Provide Interface for Other TRM Data**

Overview: This process shall provide the interface through which transit routes, schedules, and incident information can be exchanged with other transit centers. This data shall be output when new data is received and shall enable coordination between services provided by adjacent transit operations, particularly where they serve the same geographic areas. The process shall also collect and output route and schedule information when new data received from other transit centers.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'fotrm-transit\_services';  
(b) 'transit\_services\_for\_other\_TRM';  
(c) 'traffic\_incident\_data\_for\_transit'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'other\_TRM\_service\_data';  
(b) 'totrm-transit\_services'.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor for receipt of the unsolicited input flows listed above;  
(b) when any of the unsolicited input flows is received, generate the corresponding output flow.

#### **4.2.3.8 Provide Interface for Transit Service Raw Data**

Overview: This process shall provide and manage the interface to the store in which the raw transit service data is held. This data shall be sent to the process by the routes and schedules generation processes, which are the only other processes permitted to access the store, and then in read-only mode. The received data shall be loaded into the store and distributed by this process to the three processes that are responsible for distributing the data within the transit center (TRM), to other local ITS functions, and to other transit centers (Other TRM), respectively. The process shall read data from the store and return it to whichever of the other three processes has made a data request. Data shall also be received by the process from other transit centers (Other TRM) and from multimodal transportation service providers. The process shall load this data into the data store for use by the local route and schedule generation processes.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'fntsp-transit\_service\_data';
- (b) 'other\_TRM\_service\_data';
- (c) 'request\_transit\_services\_data\_for\_output';
- (d) 'request\_transit\_service\_external\_data';
- (e) 'request\_transit\_service\_internal\_data';
- (f) 'transit\_routes\_data';
- (g) 'transit\_schedule\_data'.

Solicited Input Processing: This process shall receive the following data flows as a result of requests for data retrieval from local data stores:

- (a) 'map\_transit\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'transit\_services\_data\_for\_output';
- (b) 'transit\_service\_external\_data';
- (c) 'transit\_services\_for\_other\_TRM';
- (d) 'transit\_service\_internal\_data'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when either of the last two unsolicited input flows is received, automatically output each of the solicited output flows shown above;
- (c) when either of the first two unsolicited data flows is received, the data shall be loaded into the data store transit services raw data;
- (d) when any of the unsolicited inputs that request data is received, the requested data shall be read from the store using the solicited input flow listed above, and shall then be output to the requesting process using the relevant solicited output flow listed above;
- (e) where required, the digitized data showing transit maps shall be included in the output flow generated in (d);
- (f) manage the data in the store of raw transit service data.

#### **4.2.3.9 Update Transit Map Data**

Overview: This process shall provide updates to the store of digitized map data used by the transit route generation process and as the background for displays of transit services requested by the transit fleet manager. The process shall obtain the new data from a specialist data supplier or some other appropriate data source, after receiving an update request from the transit fleet manager interface process within the function. The processes requiring data for use in transit route generation and as the background to displays will read the data from the store loaded by this process.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'request\_transit\_map\_update'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to external functions:  
(a) 'fmup-transit\_map\_update'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'tmup-transit\_map\_update\_request';  
(b) 'map\_data\_for\_transit'.

Functional Requirements: This process shall meet the following requirements:  
(a) continuously monitor for the receipt of the unsolicited data flow shown above;  
(b) when the data flow in (a) is received, generate the first solicited output data flow shown above and continuously monitor for receipt of the solicited input data flow shown above;  
(c) when the flow in (b) is received, output the second solicited output data flow shown above;  
(d) be capable of receiving the input data in a variety of formats and converting it into a single format suitable for use with the store of digitized map data;  
(e) manage the data in the store of digitized map data.

#### **4.2.4 Manage Transit Archive Data**

Overview: This process shall obtain transit passenger and deployment data, transit user payment transaction data, transit emergency data, transit security data, maintenance and personnel data, and distribute it to the Manage Archive Data function. The process shall run when a request for data is received from an external source, or when fresh data is received.

All inputs to this process are unsolicited, and all outputs are solicited, except that the 'transit\_archive\_status' is a solicited input.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor for receipt of the unsolicited input flows listed above;  
(b) when any of the unsolicited data inputs shown above is received, the process shall store them in the data store along with meta data (data attributes about the data), and update the catalog;  
(c) when the unsolicited input from the transit system operator is received, the process shall update the data store accordingly;  
(d) when the request for transit archive data is received, the process shall immediately generate the solicited output shown above from the data store and send the data to the Manage Archived Data function;  
(e) the process should then receive the transit archive status solicited input and send this status to the transit system operator;  
(f) if the status received in (e) was bad, the process shall attempt to correct the data and re-send it to the Manage Archived Data function;  
(g) data shall only be sent to the source from which the data request originated;  
(h) before output, the process shall put the data into a format that is easily read and interpreted by external processes and can also be read by travelers and transit users with the minimum of further processing.

#### **4.3.1 Monitor Transit Vehicle Condition**

Overview: This process shall monitor the condition of a transit vehicle. It shall use the transit vehicle maintenance specification to analyze brake, drive train, sensors, fuel, steering, tire, processor, communications equipment, and transit vehicle mileage to identify mileage based maintenance, out-of-specification or imminent failure conditions. The data resulting from this analysis shall be loaded by the process into the store of transit vehicle operations data, through the output flow transit vehicle maintenance. This data is then sent to the process that generates transit vehicle maintenance schedules.

Data Flows: The input data flows are unsolicited and the output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flow transit vehicle status;
- (b) when the input in (a) is received, generate the outputs identified above using data obtained from the data store through the input flow transit vehicle maintenance specs.

#### **4.3.2 Generate Transit Vehicle Maintenance Schedules**

Overview: This process shall generate transit vehicle maintenance schedules and includes what and when maintenance or repair is to be performed. Transit vehicle availability listings (current and forecast) shall also be generated by the process to support transit vehicle assignment planning. The maintenance and/or repair that is to be performed on the transit vehicle shall be scheduled by the process for a specific month, week, day(s), and hour(s). The availability of the transit vehicle that is also output by the process shall be based upon the transit vehicle maintenance schedule. The process shall load each transit vehicle maintenance schedule that it produces into the store of transit vehicle operations data, through the process that maintains this data store.

Data Flows: The input data flow is unsolicited and all output flows are solicited with the exception of the following 'transit\_vehicle\_maintenance\_schedule', which contains data subsequently written to the transit vehicle operations data store.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flow listed above;
- (b) when the input is received, produce the maintenance schedule including details of the work that is to be done and when it shall be done;
- (c) when (b) is completed, generate the outputs identified above.



### **4.3.3 Generate Technician Work Assignments**

Overview: This process shall assign transit maintenance personnel to a transit vehicle maintenance schedule. The maintenance schedule shall be received from another process and shall define what and when maintenance repair is to be performed to a specific transit vehicle. The process shall base the personnel assignment upon details about the personnel obtained from the transit fleet manager and held in a local data store. These details shall comprise personnel eligibility, work assignments, preferences and seniority. The process shall also provide these details to the transit fleet manager on request. When a work assignment has been generated, the process shall send it to the transit maintenance personnel and also to the process that monitors and verifies maintenance work activity. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the transit vehicle maintenance input is received, generate the maintenance schedule, using data in the store of transit maintenance technician data;
- (c) on completion of (b), output the work assignment to the maintenance personnel and the process that monitors and verifies maintenance work activity using the data flows identified above;
- (d) when a request for personnel data is received from the transit fleet manager, retrieve the requested data from the store and output it to the manager using the data flow identified above;
- (e) manage the data in the store of transit technician data.

### **4.3.4 Monitor And Verify Maintenance Activity**

Overview: This process shall verify that the transit vehicle maintenance activities were performed correctly and that a time stamped maintenance log for record keeping was generated. The correctness of the maintenance activities shall be judged by the process against the transit vehicle's status, the maintenance personnel's work assignment, and the transit maintenance schedules produced by other processes. The process shall save a time stamped record of all the maintenance activities performed on the vehicle into the transit vehicle maintenance log.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the input of vehicle status is received, compare it with the maintenance schedule read from the store of transit vehicle operations data, input through the transit vehicle maintenance specs data flow, and the maintenance personnel work assignments generated by another process;
- (c) if the result is satisfactory, generate the outputs identified above.

#### **4.3.5 Report Transit Vehicle Information**

Overview: This process shall provide the transit fleet managers with the capability of requesting and receiving transit vehicle maintenance information. The process shall obtain the data for each request from the store of transit vehicle operations data, through the process that manages the data store, and shall produce the output to the transit fleet manager in an easily understood form. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'tffm-transit\_vehicle\_maintenance\_specs';
- (b) 'tffm-transit\_vehicle\_maintenance\_information\_request'.

Solicited Input Processing: This process shall receive the following solicited input data flows:

- (a) 'transit\_vehicle\_maintenance\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'tffm-transit\_vehicle\_maintenance\_information';
- (b) 'transit\_vehicle\_maintenance\_data\_request', which requests data from the transit vehicle operations data store, through the process that manages the data store;
- (c) 'transit\_vehicle\_maintenance\_specs\_update'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the inputs are received, read the requested data from the store of transit vehicle operations data, through the process that manages the data store;
- (c) when (b) is complete, generate the output to the transit fleet manager identified above;
- (d) when the new transit vehicle maintenance specification data is received from the fleet manager, generate the output to the transit vehicle operations data store management process; this process subsequently sends the transit vehicle maintenance specs to another process.

#### **4.3.6 Update Transit Vehicle Information**

Overview: This process shall provide the transit maintenance personnel with the capability to update transit vehicle maintenance information. The process shall send the data received from the transit maintenance personnel to the transit vehicle operations data store management process for use by other processes.

Data Flows: The input data flow is unsolicited. The output flow is solicited and contains data that is written to the store of transit vehicle operations data, by the process that manages the data store.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flow listed above;
- (b) when the input is received from the transit maintenance personnel, load the received data into the store of transit vehicle operations data using the output flow identified above.

#### **4.3.7 Manage Transit Vehicle Operations Data Store**

Overview: This process shall manage the store of transit vehicle operations data. It shall be able to load data it receives about vehicle maintenance into the store and provide that data on request to other processes.

Data Flows: The input data flow is unsolicited and all output flows are solicited with the exception of the following:

(a) 'transit\_vehicle\_operations data', which contains data written to and read from the transit vehicle operations data store.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs containing new data are received, load the data into the store;
- (c) if the data in (b) contains new maintenance specifications, send them to the vehicle condition and verify matinenance activities processes;
- (d) when the input containing requests for data is received, retrieve the required data from the store and send it to the requesting process;
- (e) manage the data in the store of transit vehicle operations data.

#### **4.4.1.1 Manage Transit Security**

Overview: This process shall manage security in the transit system by monitoring for potential incidents. Data shall be obtained by the process from kiosks that monitor a secure area environment and from the transit system operator. This process shall analyze the data for any potential security problems and pass the results to the transit system operator for review and a recommended action. This process shall then perform the recommended security action, including broadcasting a message to the traveler, acknowledging receipt of the emergency call, redirecting the surveillance equipment, notifying other agencies, etc. Incident information shall be formatted, using parameters set up by the transit system operator, for output to the Media. Incident data shall be sent to the Manage Emergency Services function, the Provide Driver and Traveler Services function, and to other processes within the Manage Transit function to coordinate transit incident response among multiple agencies and for archival. This process shall have the ability to control surveillance equipment, including cameras, at the incident location.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following solicited input which is received as a result of output to another process:

(a) 'transit\_operator\_security\_action'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) generate the corresponding output data flows;
- (c) continuously monitor the traveler emergency details from the Provide Driver and Traveler Services function to determine if any incidents are taking place, and if so generate the appropriate outputs.

#### **4.4.1.2 Manage Transit Emergencies**

Overview: This process shall support the management of emergencies that occur in the transit system by processing information received from transit vehicles. The process shall accept inputs from either the transit vehicle driver or a transit user, the latter through such interfaces as panic buttons, alarm switches, etc. The reported emergencies shall be sent to another process for action by the transit system operator and subsequently for output to the media. The process shall also send acknowledgment data to the process providing the interface to the transit driver.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following solicited input which is received as a result of output to another process: (a) 'transit\_operator\_request\_acknowledge'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, generate the outputs identified above;
- (c) after sending notification to the transit system operator process, if no response is received, then the output message to that process shall be repeated periodically until a response is received;
- (d) the data about the emergency sent to the transit system operator shall include the transit vehicle location which is derived from separate input for the emergency data.

#### **4.4.1.3 Provide Transit System Operator Security Interface**

Overview: This process shall provide an interface for the transit system operator to identify and act upon potential information security problems and emergencies. This information shall be provided by other processes through input data flows. This process shall also provide the capability for the transit system operator to update parameters that control the output of data about the potential security problems to the media. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following solicited inputs:

- (a) 'ftso-emergency\_request\_acknowledge', which is a result of output to the transit system operator;
- (b) 'ftso-security\_action', which is a result of output to the transit system operator;
- (c) 'transit\_media\_interface\_parameters', which is data written to or requested from the store of transit media interface parameters.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs providing information about emergencies are received, generate the output to the transit system operator identified above;
- (c) as a result of (b), monitor for input of a response from the transit system operator using the input defined above;
- (d) on receipt of the data in (c), generate the output to the process that provided the information about the emergency;
- (e) when the data flow requesting the media interface parameters is received, read the data from the store and output it to the transit system operator;
- (f) when the data flow with updates to the media interface parameters is received, load the data into the store of these parameters;
- (g) manage the data in the store of transit media interface parameters.

#### **4.4.1.4 Provide Transit External Interface for Emergencies**

Overview: This process shall provide the interface through which information about security problems and emergencies detected within the transit system are distributed directly to the media and other information systems. This process shall construct its output from the data supplied by other processes. This data shall contain parameters that define the way (format, content, etc.) in which the information is output by the process. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Data Flows: All inputs are unsolicited and all outputs are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) upon receipt of either of the inputs the process shall immediately generate the appropriate output, using the supplied parameters to determine the information and format in which it shall be supplied.

#### **4.4.1.5 Provide Transit Driver Interface for Emergencies**

Overview: This process shall provide an interface to the transit vehicle through which the driver can both report an emergency situation and receive an acknowledgment. The process shall provide this interface in such a way that its operation for both inputs and outputs shall be transparent to transit users on board the vehicle and to anyone outside the vehicle, and shall not compromise the safe operation of the vehicle by the driver.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'ftd-emergency\_request'.

Solicited Input Processing: This process shall receive the following solicited input data flows:

- (a) 'transit\_driver\_emergency\_acknowledge'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'transit\_driver\_emergency\_request';
- (b) 'ttd-emergency\_information'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flow listed above;
- (b) upon receipt of the unsolicited input, immediately generate both outputs shown above;
- (c) the solicited input should then be received;
- (d) the output to the transit driver and the method of providing the input must be transparent to transit users and anyone in the vicinity of the transit vehicle.

#### **4.4.1.6 Collect Transit Vehicle Emergency Information**

Overview: This process shall collect data about emergencies that occur on-board transit vehicles for output to the media and the Manage Emergency Services function. These emergencies may be reported by either the transit driver or a transit user, the latter through such interfaces as panic buttons, alarm switches, etc. For output to the media interface process, the data shall be combined with the data in the media interface parameters data store.

Data Flows: All input data flows are unsolicited and all output flows are solicited, with the exception of the following which contains data read from a data store:

(a) 'transit\_media\_emergency\_interface\_parameters'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flow listed above;
- (b) when the input is received, generate the two outputs identified above, adding the data from the media interface parameters store to that being sent to the media interface process.

#### **4.4.2 Coordinate Multiple Agency Responses to Transit Incidents**

Overview: This process shall provide transit fleet managers with an interface through which they can control the coordination data sent to the Manage Emergency Services function following the detection of a security problem or emergency within the transit operations network by other processes. The process shall use data from the store of predefined responses to security problems and emergencies in the outputs that it sends to the Manage Emergency Services function. If no match can be found then the process shall send all the available data to the transit fleet manager for action. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'transit\_emergency\_information';
- (b) 'transit\_incident\_information'.

Solicited Input Processing: This process shall receive the following solicited input data flows:

- (a) 'transit\_preplanned\_responses\_for\_incidents', which contains data requested from a data store;
- (b) 'tffm-coordination\_data', which is received as a result of a previous output to the transit fleet manager;
- (c) 'transit\_incident\_coordination\_data', which is received as a result of output being sent to processes in the Manage Emergency Services function.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'transit\_coordination\_data';
- (b) 'tffm\_coordination\_request'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when either of the information inputs is received, search the store of predefined responses for a match;
- (c) if (b) is successful, generate the output to the Manage Emergency Services function identified above;
- (d) if (b) is unsuccessful, output all the data received as input to the transit fleet manager and monitor for receipt of the solicited input flow from the manager;
- (e) when the solicited input flow in (d) is received, generate the output to the Manage Emergency Services function identified above;
- (f) use the appropriate database mechanism(s) to retrieve data from the store of predefined responses identified above.

#### **4.4.3 Generate Responses for Transit Incidents**

Overview: This process shall provide the interface through which the transit fleet manager can enter and review predefined responses to security problems and emergencies that have been detected by other processes within the Manage Transit function. This data shall be stored in a form which can be used by another process to provide coordination data to the Manage Emergency Services function. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Data Flows: Both input data flows are unsolicited and the output flow is solicited. The following in/out flow contains data requested from or written to a data store:

(a) 'transit\_preplanned\_responses\_for\_incidents'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the input requesting output of the store contents is received, read the data from the store of transit predefined responses;
- (c) when (b) has been successfully completed, generate the output to the transit fleet manager identified above;
- (d) when the input in (a) contains new transit predefined responses data, update the store, overwriting any old data as necessary;
- (e) manage the data in the store of preplanned responses.

#### **4.5.1 Assess Transit Driver Performance**

Overview: This process shall assess the transit driver's performance at previous work assignments. The process shall carry out this activity by 1) utilizing standardized performance evaluation criteria set forth by governmental regulations and transit operating company policies, 2) assessing the transit driver's driving history, and 3) assessing comments from the transit driver's supervisor(s). It shall also use the details of any moving violations or accidents, supervisor comments, government regulations, and company policies. The data shall be sent to this process by the process that provides the interface to a local data store, each time that the store is updated with driver performance data.

Solicited Input Processing: This process shall receive the following solicited input data flow:

(a) 'transit\_driver\_performance\_considerations', contains data requested from a data store.

Solicited Output Processing: This process shall provide the following output flows as a result of the above input being received:

- (a) 'transit\_driver\_performance', contains data written to a data store;
- (b) 'transit\_driver\_performance\_data', contains data sent to another process.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input data flow listed above;
- (b) when the input is received, analyze the data it contains and generate the two output flows identified above.

#### **4.5.2 Assess Transit Driver Availability**

Overview: This process shall assess the transit driver's availability based on previous work assignments plus health and vacation commitments. The process shall carry out this activity by 1) utilizing standardized transit driver work criteria set forth by governmental regulations and company policies, 2) monitoring the transit driver's health status and vacation status, and 3) monitoring the transit driver's accumulated work hours. The data shall be sent to this process by the process that provides the interface to a local data store, each time that the store is updated with driver availability data.

Solicited Input Processing: This process shall receive the following solicited input data flow:  
(a) 'transit\_driver\_availability\_considerations', contains data requested from a data store.

Solicited Output Processing: This process shall provide the following output flows as a result of the above input being received:

- (b) 'transit\_driver\_availability', contains data written to a data store;
- (c) 'transit\_driver\_availability\_data', contains data sent to another process.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input data flow listed above;
- (b) when the input is received, analyze the data it contains and generate the two output flows identified above.

#### **4.5.3 Access Transit Driver Cost Effectiveness**

Overview: This process shall assess the transit driver's cost effectiveness when carrying out previous work assignments. The process shall perform this activity by 1) utilizing standard transit driver cost criteria set forth by governmental regulations and company policies, and 2) monitoring the transit driver's hourly wage and accumulated work hours. The data shall be sent to this process by the process that provides the interface to a local data store, each time that the store is updated with driver cost effectiveness data.

Solicited Input Processing: This process shall receive the following solicited input data flow:  
(a) 'transit\_driver\_cost\_effectiveness\_considerations', contains data requested from a data store.

Solicited Output Processing: This process shall provide the following output flows as a result of the above input being received:

- (a) 'transit\_driver\_cost\_effectiveness', contains data written to a data store;
- (b) 'transit\_driver\_cost\_effectiveness\_data', contains data sent to another process.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input data flow listed above;
- (b) when the input is received, analyze the data it contains and generate the two output flows identified above.



#### **4.5.4 Assess Transit Driver Eligibility**

Overview: This process shall assess the transit driver's eligibility for future work assignments. The process shall carry out this activity by 1) monitoring the transit driver's performance, availability and cost effectiveness, 2) utilizing standardized transit driver eligibility criteria set forth by governmental regulations and company policies, and 3) ensuring that the transit driver has the required experience, education and certifications. The data shall be sent to this process in one of two ways: 1) by the process that provides the interface to a local data store, each time that the store is updated with driver eligibility data, or 2) the data is produced as the result of analysis work carried out by other processes within the Manage Traffic function.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following solicited flows that interface to the data store:

- (a) 'transit\_driver\_eligibility\_considerations', which contains data requested from a data store;
- (b) 'transit\_driver\_eligibility', which contains data written to a data store.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input data flows listed above;
- (b) when any of the input flows are received, generate the outputs identified above.

#### **4.5.5 Generate Transit Driver Route Assignments**

Overview: This process shall assign transit drivers to transit schedules. The transit driver's eligibility, route preferences, seniority, and transit vehicle availability shall be used by the process to determine the transit driver's route assignment. The output produced by the process shall be sent to the transit driver in the form of the next work assignment. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when either of the inputs containing eligibility or route assignment consideration data is received, generate the output to the transit driver identified above;
- (c) when any of the other inputs is received, load the data into a local data store for use in future route assignment calculations;
- (d) manage the data in the store of transit driver route data.

#### **4.5.6 Update Transit Driver Information**

Overview: This process shall provide the interface through which the transit driver can input data to the store of transit driver information. The interface provided by this process shall enable the transit driver to update personal availability and route assignment information. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Data Flows: The input data flow is unsolicited and the output flow is solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flow from the transit driver listed above;
- (b) when the input is received, generate the output data flow identified above.

#### **4.5.7 Report Transit Driver Information**

Overview: This process shall provide the interface between the transit fleet manager and the store of driver information. The interface provided by the process shall enable the fleet manager to review and update transit driver information. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Data Flows: The input data flows are unsolicited and the output flows are solicited with the exception of the following solicited input:

(a) 'transit\_driver\_information\_output', which is the result of a data request sent to transit driver information interface process.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows from the transit fleet manager listed above;
- (b) when any of the inputs in (a) is received, output the appropriate data flow to the interface process for the store of transit driver information identified above;
- (c) if the input flow requested driver information, continuously monitor for receipt of the data flow sent from the data store interface process containing the requested data;
- (d) when the input data flow in (c) is received, generate the appropriate output flow to the transit fleet manager, containing the requested data.

#### **4.5.8 Provide Transit Driver Information Store Interface**

Overview: This process shall provide the read and write interface to the store of transit driver information. The interface enables the contents of the store to be updated with inputs received from the transit driver and transit fleet manager via other processes, as well as, inputs resulting from analysis of driver availability, cost effectiveness, eligibility, and performance carried out by other processes. The process shall also supply data to these processes when the store is updated with information from the transit driver and fleet manager. It shall also supply data to the process that generates driver route assignments when any of the analysis inputs is received.

Data Flows: The input data flows are unsolicited and the output flows are solicited with the exception of the following solicited inputs:

- (a) 'transit\_driver\_information', which contains data written to a data store;
- (b) 'transit\_driver\_availability', which contains data received as a result of output being sent to the availability analysis process;
- (c) 'transit\_driver\_cost\_effectiveness', which contains data received as a result of output being sent to the cost effectiveness analysis process;
- (d) 'transit\_driver\_eligibility', which contains data received as a result of output being sent to the eligibility analysis process;
- (e) 'transit\_driver\_performance', which contains data received as a result of output being sent to the performance analysis process.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when either the input or update data flow is received, load the data into the store of transit driver information and send the data to the appropriate analysis process;
- (c) when the input containing the results of the availability, cost effectiveness, eligibility and performance analysis is received, again load it into the store of transit driver information and send the data to the driver route assignment process;
- (d) when the input containing the request for output of the current store data is received from the transit fleet manager interface process, read the data from the store and send it to the requesting process;
- (e) manage the data in the store of transit driver information.

#### **4.6.1 Detect Transit User on Vehicle**

Overview: This process shall detect embarking transit users on-board a transit vehicle and read data from the traveler card / payment instrument that they are carrying. The process shall provide an image of all transit users which shall be used for violation processing of those who do not have a traveler card / payment instrument or whose transit fare transaction fails. It shall obtain an image of the required accuracy under all lighting conditions and over the range of speeds with which transit users will pass through the fare collection point on a transit vehicle.

Data flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the transit user tag data input flow is received, generate the transit user tag identity output flow identified above;
- (c) when the flow requesting an image of the transit user is received, if necessary convert the video data in the flow from the transit user into a digital form, and output the digitized image in the transit user vehicle image data flow;
- (d) if the input flow in (c) is not received, discard the video image data in the flow from the transit user;
- (e) all input and output flows must be encrypted in such a way that it is not possible to determine the credit identity being transmitted using any form of digital or analog encryption techniques.

#### **4.6.2 Determine Transit User Needs on Vehicle**

Overview: This process shall determine the transit user's travel routing based on the transit vehicle's current location and the user's destination. The process shall support the transit user's routing, enabling it to include travel on the vehicle for all or part of its route and (possibly) transfer to another vehicle on another route. In order to achieve this capability, the process shall have access to the complete range of transit services (routes and schedules) that are available to the transit user. The transit vehicle's location shall be provided by other processes within the Manage Transit function. Details of all transactions with the transit user's payment details removed, shall be sent by this process to the interface process for loading into a data store.

Data flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the transit user tag identity input flow is received, continuously monitor for receipt of the flow with the other transit user information;
- (c) when both the flows in (b) have been received, use the vehicle location and transit services inputs to generate the output flows identified above;
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the transit user's payment information being transmitted, using any form of digital or analog encryption techniques.

#### **4.6.3 Determine Transit Fare on Vehicle**

Overview: This process shall calculate the transit user's fare based on the origin and destination provided by the user. The process shall calculate the fare using the transit routing, transit fare category, transit user history, and route-specific information. The accumulated data shall be sent by this process to another process for the actual implementation of the fare payment transaction.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following which contains data requested from a data store:  
(a) 'transit\_fares\_for\_vehicle'.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor for receipt of the input flows listed above;  
(b) when the transit user ride data input flow is received, generate the output data flow identified above, using the data sent from the store of transit fares for vehicles;  
(c) all input and output flows must be encrypted in such a way that it is not possible to determine the transit user's payment information being transmitted, using any form of digital or analog encryption techniques.

#### **4.6.4 Manage Transit Fare Billing on Vehicle**

Overview: This process shall manage the transit user fare payments on-board a transit vehicle. The process shall receive information about the fare that is to be paid and the method of payment adopted by the transit user. It shall always support two modes of operation to complete the back end financial processing: infrastructure interactive, or semi-autonomous batch processing. The interactive method shall be used for individual transactions, such as those in paratransit type operations where value/volume ratios are high. It shall send transit user fare payment data to processes in the Provide Electronic Payment Services function for financial authorization and transaction processing, plus the return of the result for display to the transit user. A failed transaction shall result in the transmission of an image of the transit user to another process. Batch processing shall be used by the process for routes where value/volume ratios are low. It shall be performed using all the same data flows and processes as in the interactive method, except that transaction records are queued in a transaction buffer store which shall be maintained by this process. The accumulated data for the fare transactions shall be sent to the Provide Electronic Payment Services function to request payment processing of one or more transit fare transactions from on-board a transit vehicle. The accumulated data shall be sent on command from the transit vehicle driver, or when the transit vehicle has reached a convenient point on its route. The transit vehicle driver shall be notified when batch processing has completed successfully. In either mode of operation, a record of the status of all transit fare processing shall be sent to an interface process for the fare collection storage database.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) if the fare processing mode is not set, then request it as input from the transit vehicle driver;
- (c) when confirmation of the mode is received, and at the end of each service, request an update to the store of bad tag data, completely overwriting the existing data with the new data;
- (d) when the transit user fare input data is received, check the payment information against the store of bad tag data;
- (e) if a match is found in (d), output a transaction failed message to the transit user;
- (f) if no match is found in (d), generate the necessary outputs identified above that are consistent with the mode of processing being employed;
- (g) when confirmation of an interactive mode transaction is received, pass on the result to the transit user;
- (h) transmit the fare transaction data collected in batch mode when an instruction is received from the transit vehicle driver, the vehicle reaches the end of its current service, or the store of fare data becomes full;
- (i) when confirmation of successful completion of batch mode fare processing is received, clear the fare data from the store and inform the transit vehicle driver;
- (j) if the batch mode fare transaction fails, then inform the transit vehicle driver;
- (k) all input and output flows must be encrypted in such a way that it is not possible to determine the transit user's payment information being transmitted, using any form of digital or analog encryption techniques;
- (l) manage the data in the stores of bad tag data and the transit user transaction buffer.

#### **4.6.5 Provide Transit User Fare Payment Interface on Vehicle**

Overview: This process shall provide the fare payment interface for the transit user on-board a transit vehicle. The process shall prompt the transit user for information necessary that has not been provided for the transaction. The result of the transit service ride fare payment plus other services request and payment, shall be reported back to the transit user by the process. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs from the transit user are received, generate the appropriate outputs identified above, prompting the user for any information that has not been supplied;
- (c) when any response flow is received, generate the appropriate output to the transit user to indicate the success or failure of the requested transaction;
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the transit user's payment information being transmitted, using any form of digital or analog encryption techniques.

#### **4.6.6 Update Transit Vehicle Fare Data**

Overview: This process shall provide a database on-board the transit vehicle for use in fare processing. The database shall contain transit fare information from which the fares for all possible trips within the transit operational network can be determined.

Data Flows: The input data flow is unsolicited and the output flow contains data written to a data store:

- (a) 'transit\_fares\_for\_vehicle\_store'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flow listed above;
- (b) when the input flow is received, generate the output flow identified above to update the contents of the store of transit fares, and send the data on to the receiving process;
- (c) manage the data in the store of transit fares.

#### **4.6.7 Provide Transit Vehicle Passenger Data**

Overview: This process shall provide passenger loading and fare statistics data to other ITS functions. The process shall send the data automatically at regular periodic intervals using data collected in the store of fare transaction data. This store receives data from the process that interfaces to the user on-board a transit vehicle.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following which contains data requested from and written to a data store:

- (a) 'transit\_vehicle\_fare\_collection\_data'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, write the data into the store of collected transit fare data;
- (c) at periodic intervals, read all the data from the store and send it to the other processes in the Manage Transit function using the passenger data flow identified above;
- (d) manage the data in the store of collected transit fare data;
- (e) the data contained in the store shown above shall not contain any reference to a transit user's identity or credit payment information.

#### **4.6.8 Manage Transit Vehicle Advanced Payments**

Overview: This process shall act as the interface for advanced payment of tolls and parking lot charges from the transit user. Requests for these advanced payments shall be passed to other processes in the Provide Electronic Payment Services function for transaction processing. The process shall ensure that the response to these requests from transit users is returned to the transit vehicle from which it was made.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the request input data flow is received from the transit user interface process, generate the request output data flow identified above;
- (c) as a result of (b), continuously monitor for receipt of the confirmation flow identified above;
- (d) when the flow in (c) is received, output the response flow identified above to the transit user interface process;
- (e) all input and output flows must be encrypted in such a way that it is not possible to determine the transit user's payment information being transmitted, using any form of digital or analog encryption techniques.

#### **4.7.1 Provide Transit User Roadside & Vehicle Data Interface**

Overview: This process shall provide public transit information to Transit Users at roadside locations. These locations may consist of transit vehicle stops or other locations that provide general public transit information. The process shall enable the roadside unit to obtain information about the transit services on request from the local transit user interface process and to receive data about late running services from other processes within the Manage Transit function. This process shall also provide the roadside (transit stop) interface through which transit users receive information about an approaching transit vehicle or one that has already arrived. The process shall output the data to the transit user as soon as it is received and shall load all data into the local store for future use. Output of the data shall be maintained until the vehicle leaves the stop, when the process shall cease output of the data and delete it from the local store. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'transit\_vehicle\_arrival\_time';
- (b) 'ftu-transit\_information\_request';
- (c) 'transit\_vehicle\_user\_data'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes:

- (a) 'transit\_services\_for\_travelers';
- (b) 'transit\_services\_roadside\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'transit\_services\_roadside\_data';
- (b) 'transit\_services\_travelers\_request';
- (c) 'ttu-transit\_information';
- (d) 'ttu-transit\_vehicle\_information'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the input data flow, 'transit\_vehicle\_user\_data', is first received, calculate the time before the transit vehicle will arrive using the difference between the transit vehicle arrival time and the current time;
- (c) output the data calculated in (b) to the transit user and store the data locally to provide a continuous source of data;
- (d) once the data shows that the transit vehicle is leaving the stop, clear the output for that vehicle and delete its data from the local data store;
- (e) if the input ceases to be received from the transit vehicle, maintain the output using the locally stored data;
- (f) periodically send the output flow requesting transit services for travelers and check for the response input flow;
- (g) send all data received to the local store 'transit\_services\_roadside\_data';
- (h) when the input request from the transit user is received, read the data in the local data store to see if the information is already present;
- (i) if the required information in (h) is not present, generate the output flow requesting transit services for travelers and check for the response input flow;
- (j) when the data flow in (i) is received, or if the data was read from the local data store, generate the output flow to the transit user with the requested data;
- (k) manage the data in the store of transit services roadside data.



#### **4.7.2.1 Detect Transit User at Roadside**

Overview: This process shall detect transit users embarking at a roadside transit stop and read data from the traveler card / payment instrument that they are carrying. The process shall provide an image of all transit users which shall be used for violation processing of those who do not have a traveler card / payment instrument or whose transit fare transaction fails. It shall obtain an image of the required accuracy under all lighting conditions and over the range of speeds with which transit users will pass through the fare collection point at the roadside, i.e., a transit stop.

Data flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the transit user tag data input flow is received, generate the transit user tag identity output flow identified above;
- (c) when the flow requesting an image of the transit use is received, if necessary convert the video data in the flow from the transit user into a digital form, and output the digitized image in the transit user vehicle image data flow;
- (d) if the input flow in (c) is not received, discard the video image data in the flow from the transit user;
- (e) all input and output flows must be encrypted in such a way that it is not possible to determine the credit identity being transmitted using any form of digital or analog techniques.

#### **4.7.2.2 Determine Transit User Needs at Roadside**

Overview: This process shall determine the transit user's travel routing based on the user's destination and the location of the roadside transit stop from which the route request is being made. The process shall support the transit user's routing enabling it to include travel on all or part of the route(s) operating from the stop and (possibly) transfer to another route. In order for this to be achieved, the process requires access to the complete range of transit services (routes and schedules) that are available to the transit user. Details of all transactions with the transit user's payment details removed, shall be sent by this process to the interface process for loading into the transit roadside fare collection data store.

Data flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the transit user tag identity input flow is received, continuously monitor for receipt of the flow with the other transit user information;
- (c) when both the flows in (b) have been received, use the vehicle location and transit services inputs to generate the output flows identified above;
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the transit user's payment information being transmitted, using any form of digital or analog encryption techniques.

#### **4.7.2.3 Determine Transit Fare at Roadside**

Overview: This process shall calculate the transit user's fare based on the origin and destination provided by the user. The process shall calculate the fare using the transit routing, transit fare category, and transit user history components of the ride data together with data provided by the interface process to the database of transit fares. The accumulated data shall be sent by the process to another process for the actual implementation of the fare payment transaction.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following which contains data requested from a data store:

(a) 'transit\_fares\_for\_roadside'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the transit user ride data input flow is received, generate the output data flow identified above, using the data in the store of transit fares for roadside;
- (c) manage the data in the store of transit fares for roadside;
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the transit user's payment information being transmitted, using any form of digital or analog encryption techniques.

#### **4.7.2.4 Manage Transit Fare Billing at Roadside**

Overview: This process shall generate the data necessary to enable the financial transaction between the transit user and the transit provider to be completed at the roadside, i.e., at a transit stop. The process shall accept and process current transit passenger fare collection information. The process shall perform the front end transaction between the transit user and the transit system, and use the infrastructure interactive mode of operation to complete the back end processing. This means that the process shall send data about each transaction to processes in the Provide Electronic Payment Services function for the back end financial authorization and transaction processing. The process shall then await the return of the result for display to the transit user before accepting the next transaction. A failed transaction shall result in the transmission of an image of the transit user to another process. A record of the status of all transit fare processing shall be sent to another process for storage in a fare collection database.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the transit user fare input is received, generate the necessary outputs identified above that are consistent with the type of processing being employed;
- (c) all input and output flows must be encrypted in such a way that it is not possible to determine the transit user's payment information being transmitted, using any form of digital or analog encryption techniques.

#### **4.7.2.5 Provide Transit User Roadside Fare Interface**

Overview: This process shall provide the interface for the transit user at the roadside, i.e., at a transit stop. The interface shall enable the transit user to specify the required destination of a transit service ride and request other (yellow pages) services. The process shall prompt the transit user for information necessary for the transaction that has not been provided. The result of the transit service ride fare payment plus other services request and payment, shall be reported back to the transit user by the process. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs from the transit user are received, generate the appropriate outputs identified above, prompting the user for any information that has not been supplied;
- (c) when either of the response flows is received, generate the appropriate output to the transit user to indicate the success or failure of the requested transaction;
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the transit user's payment information being transmitted, using any form of digital or analog encryption techniques.

#### **4.7.2.6 Update Roadside Transit Fare Data**

Overview: This process shall provide a database at the roadside, i.e., a transit stop, for use in fare processing. The database shall contain transit fare information from which the fares for all possible trips within the transit operational network can be determined.

Data Flows: The input data flow is unsolicited and the output flow contains data written to a data store:

- (a) 'transit\_fares\_for\_roadside'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flow listed above;
- (b) when the input flow is received, generate the output flow identified above to update the contents of the data store of transit fares;
- (c) manage the data in the store of transit fares for roadside.

#### **4.7.2.7 Provide Transit Roadside Passenger Data**

Overview: This process shall create passenger loading and fare statistics data based upon data collected at the roadside and send this data to the store of transit operations data. The process may send the data at regular periodic intervals, on-demand, or through some other trigger mechanism. The process shall create its outputs using information collected in the store of fare transaction data. This data is received from other processes at the roadside, i.e., at a transit stop.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following which contains data requested from and written to a data store:

- (a) 'transit\_fare\_collection\_data'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, write the data into the store of collected transit fare data;
- (c) at periodic intervals, read all the data from the data store and send it to the other processes in the Manage Transit function using the passenger data flow identified above;
- (d) manage the data in the store of collected transit fare data;
- (e) the data contained in the store shown above shall not contain any reference to a transit user's identity or credit payment information.

### **5.1.1 Identify Emergencies from Inputs**

Overview: This process shall enable existing emergency centers to receive the calls, determine response requirements (enough to determine what responding agencies to notify), and route distress calls to those pre-designated responding agencies. This process shall provide the identified emergency information in a standard format as required. This process receives emergency requests from the general public, public safety agencies, and other service providers (e.g. a Mayday service provider). Every set of emergency data received shall be assigned a level of confidence by the process depending on its source, so that the subsequent processes can assess the level of response to be provided. This process shall include verification, in that it shall determine if a number of inputs might all be referring to the same incident, then designate that incident in its notifications to the most appropriate responding agencies. By reconciling numerous reports and other collaborative information from the field (e.g. CCTV images, reports from field staff), the verification function confirms the existence, location, and nature of a reported emergency.

Data Flows: All inputs are unsolicited and all outputs are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when any of the inputs are received, the process shall perform an analysis of the data to produce the output in a standard format;
- (c) the data format produced in (b) shall include a classification of the level of confidence or probability that the data is accurate, i.e., that it relates to a 'real' emergency and the information is correct.

### **5.1.2 Determine Coordinated Response Plan**

Overview: This process shall determine the appropriate response for a verified emergency. This process shall classify, prioritize, and respond to verified emergencies accordingly. This process shall also determine the appropriate response plan. In the case of personal vehicle security this process shall support the activation of remote controlled functions requested by a vehicle. A detailed description of the emergency, and any request for remote controlled emergency system activity, and any suggested response plan shall be sent to other processes for implementation. The same information shall also be forwarded to other emergency center processes for information and possible action. This process shall send feedback to the Manage Maintenance and Construction process to coordinate the response to an emergency with the actions taken by maintenance and construction.

Data Flows: All inputs are unsolicited with the exception of emergency\_service\_allocation\_data which is a solicited flow from the data store. All outputs are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flow listed above;
- (b) when the input is received, the response will be determined from the data requested from the interface process that manages the store of emergency service allocation criteria and any functions requested by a vehicle shall be activated;
- (c) when (b) is complete, the data shall be sent to both the emergency management and communications processes.

### 5.1.3 Communicate Emergency Status

Overview: This process shall receive the emergency service response plans and the status of their implementation for dissemination to other ITS functions. That dissemination shall be subject to sanitization according to pre-arranged rules, implemented in this process. The process shall also read data about emergency responses from the emergency services action log. All data shall be communicated by the process in standard formats to travelers, drivers, and other ITS functions. In the case of in-vehicle, personal traveler, and transit emergencies, after each emergency becomes a verified incident, the data shall be sent as soon as new status or plan data is received. Dissemination shall be controlled according to rules determined in this process to limit the information transmitted to that information useful to the receiver. Emergency information that is received from the emergency telephone system or E911 operators, shall be disseminated only when the response plan data is first received. That has the effect of only disseminating data on incidents that have been verified, since only verified incidents will have response plans. The process shall also extract data from the emergency service action log on request from processes in other ITS functions, and from the emergency services operator. Communication to in-vehicle processes may include requests for additional information or a set of commands to the vehicle security system.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following solicited input which contains data requested from a data store:  
(a) 'emergency\_service\_action\_log'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when either the input of emergency response plan data or detailed emergency status is received, read any associated data from the emergency service action log data store and generate the outputs to the vehicle, traveler, and transit functions identified above;
- (c) if the input in (b) is the first notification for an emergency, and it was received from the emergency telephone or E911 operator, send the acknowledge message identified above;
- (d) when any of the input flows requesting information is received, read the data from the emergency service action log, and send it in the data flow of incident information identified above to the requesting process;
- (e) manage the data in the store of the emergency service action log.

#### **5.1.4 Manage Emergency Response**

Overview: This process shall enable existing emergency centers to receive emergency calls, determine response requirements to the extent necessary to route the information, route distress calls and emergency information to predesignated responding agencies and vehicles, and request additional resources. All identified emergency information shall be provided by the process in a standard format as required. The process shall also communicate with commercial fleet managers to obtain details of cargo and other vehicle data where this will affect the response of the emergency services, e.g., in the case of a vehicle carrying a HAZMAT load. The current status of all emergency service responses shall be stored by the process in an action log, for access by the communications process. This process shall receive roadway maintenance status, work zone status, and work plan information from the Manage Maintenance and Construction function, and provide feedback regarding the work plan to that function. This process shall identify and request maintenance actions and resources from that same function. The process shall also request and receive environmental information from the Weather Service and Surface Transportation Weather Service.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following:

1. Output to a data store:
  - (a) 'emergency\_service\_action\_log'.
  
2. Solicited Input Processing:
  - (a) 'cf\_hazmat\_vehicle\_information', which is received as a result of output to a process in the Manage Commercial Vehicles function;
  - (b) 'emergency\_vehicle\_dispatch\_status', which is received as a result of output to another process in the Manage Emergency Services function;
  - (c) 'resource\_deployment\_status', which is received as a result of output to another process in the Manage Emergency Services function.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the input of emergency response plan data is received, generate the output data flows, and create an initial entry in the emergency response action log data store;
- (c) when other inputs are received, update the data for the emergency to which they relate in the emergency service action log data store;
- (d) if the emergency vehicle dispatch status indicates a failure, send the data to the action log and to the emergency services operator interface process;
- (e) manage the data in the store of the emergency service action log.

### **5.1.5 Manage Emergency Service Allocation Store**

Overview: This process shall manage the store of data that defines the way in which the emergency service resources shall be deployed in response to emergencies. Deployment shall vary by certain criteria, such as, type of emergency, source of information, time of day, location, etc. Parameters to define this allocation shall be loaded into the data store following receipt from the process that provides the emergency services operator interface.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'emergency\_service\_allocation\_data\_output\_request';
- (b) 'emergency\_service\_allocation\_data\_request';
- (c) 'emergency\_service\_allocation\_data\_updates'.

Solicited Input Processing: This process shall receive the following data flow as a result of requests for data retrieval:

- (a) 'emergency\_service\_allocation\_criteria', which is data retrieved from a data store.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'emergency\_service\_allocation\_criteria', which is data written to a data store;
- (b) 'emergency\_service\_allocation\_data';
- (c) 'emergency\_service\_allocation\_data\_output'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the inputs are received, generate the appropriate outputs identified above to read to or write data from the data store of emergency service allocation criteria;
- (c) manage the data in the store of emergency service allocation criteria.

### **5.1.6 Process Mayday Messages**

Overview: This process shall receive mayday messages from vehicles and drivers, determine whether the mayday message indicates an emergency that requires the attention of public safety agencies, and forward mayday emergency data to the appropriate agency when assistance is required. The content of the data flow 'mayday emergency data' shall include all the key data from the incoming data flow 'emergency request details' and an agency ID indicating the mayday provider that received and processed the mayday message. While not depicted in the logical architecture, the process will also be heavily dependent on voice communications to better ascertain the nature and severity of the emergency and to report this information to the appropriate local agency. This process shall also receive and keep a historical log of signals sent in the mayday vehicle tracking data store.

Data Flows: All inputs are unsolicited with the exception of mayday\_vehicle\_tracking which is solicited along with all outputs.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when any of the inputs are received, the process shall perform an analysis of the data to produce the output in a standard format;
- (c) the data format produced in (b) shall include a classification of the level of confidence or probability that the data is accurate, i.e., that it relates to a 'real' emergency and the information is correct.

### **5.1.7.1 Monitor Secure Area**

Overview: This process shall monitor the secure area environment using surveillance equipment and provide audio incident advisory information to travelers in that environment. This process shall receive data from the Manage Transit and Provide Driver and Traveler Services functions to control the surveillance equipment; this process shall return data and/or video from that equipment to those functions. This process shall receive information to be broadcast to travelers in the secure area environment from the Manage Transit and Manage Emergency Services functions.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor the video (surveillance information) input flow from the secure area environment to determine if any incidents are taking place, and forward this information to the other processes;
- (b) monitor for broadcast message from Manage Emergency Services and Manage Transit functions and forward to the traveler.

### **5.1.7.2 Manage Secure Area Security**

Overview: This process shall manage the security in non-transit related secure environments by monitoring for potential incidents. Data shall be obtained by the process from a variety of sources and assessed for any security problems. Problems shall be passed by the process to the emergency system operator for review and required action. Information about incidents shall also be sent by this process to another process for output to the media, using interface parameters set up by the emergency system operator.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following solicited input which is received as a result of output to another process:

- (a) 'operator\_monitoring\_action\_command'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) generate the corresponding output data flows;
- (c) continuously monitor for secure area surveillance information to determine if any incidents are taking place, and if so generate the appropriate outputs.

### **5.1.7.3 Report Traveler Emergencies**

Overview: This process shall provide an interface function through which travelers can declare emergencies. The traveler may be at a kiosk or other device, transit stop, transit depot, rest stop, emergency pull off, park and ride lot, etc. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flows from the inputs listed above;
- (b) when any of the inputs in (a) are received, check for content;
- (c) generate the output identified above and send the data to the next process;
- (d) when the emergency request input is received from the traveler, generation of the output to the Manage Emergency Services function must take priority over all other processing;
- (e) following the output of the message in (d), all other processing shall be suspended until the acknowledgment data flow is received from the Manage Emergency Services function, and the output has been displayed.



## 5.2 **Provide Operator Interface for Emergency Data**

Overview: This process shall provide the emergency services operator with an interface to the other processes in the Manage Emergency Services function. The process shall enable the operator to review and update the data used to allocate emergency services to incidents, applying temporary overrides to current emergency service allocations to suit the special needs of a current incident, and requesting output of the log of emergency service actions. This process shall support remote security monitoring of areas where travelers may be vulnerable. It shall also enable the output of a message showing the failure of an emergency vehicle dispatched in response to an incident. This output shall override all other outputs. The process shall support inputs from the emergency services operator in both manual and audio form, and shall provide its outputs in audible and visual forms. The visual output may appear in either hardcopy or as a display, or both, and an audible output shall accompany the emergency vehicle dispatch failure message.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows from the emergency services operator and the emergency vehicle dispatch failure flow listed above;
- (b) when the inputs from the emergency services operator are received, send the appropriate output data flows to other processes;
- (c) when the responses to the flows generated in (b) are received, send the appropriate outputs to the emergency services operator;
- (d) when the emergency vehicle dispatch failure flow is received, generate the appropriate output flow listed above, overriding all other output flows.

### 5.3.1 Select Response Mode

Overview: This process shall select the appropriate emergency services and their vehicle(s) to respond to incidents. The process shall determine the type and number of vehicles to be dispatched, and provide the vehicle(s) with information on the type and location of the incident. It shall request data about the vehicles that are available from the interface process to the data store of emergency vehicle status. Once the vehicle determination has been made, the status data shall be changed by the process, and incident data sent to the process responsible for the actual dispatch of the vehicle(s).

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'emergency\_vehicle\_response\_request';
- (b) 'emergency\_vehicle\_incident\_details'.

Solicited Input Processing: This process shall receive the following solicited input data flow as a result of requesting information from another process:

- (a) 'emergency\_vehicle\_status\_data\_for\_responses'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'emergency\_vehicle\_status\_data\_change', an update command for a store (managed by another process);
- (b) 'emergency\_vehicle\_dispatch\_status';
- (c) 'emergency\_vehicle\_status\_data\_request';
- (d) 'emergency\_vehicle\_dispatch\_data'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the two vehicular inputs identified above;
- (b) when the emergency vehicle response request input data flow is received, request data from the process providing the interface for the store of emergency vehicle status;
- (c) use the data obtained in (b) to determine the vehicle(s) necessary to provide the appropriate response to the incident;
- (d) when the vehicle(s) have been determined in (c), generate the output identified above to dispatch each vehicle;
- (e) send changed emergency vehicle status data back to the data store interface process to reflect the new vehicle status resulting from output of the dispatch data;
- (f) when all the required vehicle type(s) and numbers have been dispatched, send the emergency vehicle dispatch status data flow to the process responsible for managing emergency responses, showing that the dispatch was successful;
- (g) if no vehicles of the required type(s) are available, send the emergency vehicle dispatch status data flow to the process responsible for managing emergency responses, showing that the dispatch has failed for the particular vehicle type(s).

### **5.3.2 Dispatch Vehicle**

Overview: This process shall direct selected emergency vehicles and drivers to respond to an incident, receive acknowledgment that they will in fact respond, and provide them with the location and details of the incident that was pre-calculated and sent to this process.

If called for, the process shall send details to the Manage Traffic function to request a traffic control preemption be provided for the vehicle(s) if that mode of preemption is available and chosen. The data for the emergency vehicle driver shall be sent to the driver interface process.

Data Flows: All inputs are unsolicited with the exception of emergency\_traffic\_control\_response and emergency\_vehicle\_route which are solicited as are all outputs.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the dispatch and status data input flows listed above;
- (b) when the flows in (a) are received, generate the outputs identified above to request the emergency vehicle route and provide the driver with information about the incident, monitoring for the receipt of any reply data;
- (c) when the emergency vehicle route data is received, generate the emergency traffic control request data and send it to the Manage Traffic function.

### **5.3.3 Track Vehicle**

Overview: This process shall manage information about the location of all emergency vehicles available for dispatch and that have been dispatched, and the ETA for vehicles en route. The process shall send this data to the store of emergency vehicle status data. If the vehicle is on its way to an emergency, as indicated by the received vehicle status, the process shall also send data to processes in the Manage Traffic function that will enable the vehicle to have whatever level and mode of preemption is available and granted at traffic signals.

Data Flows: All input data flows are unsolicited and the output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input data flows listed above;
- (b) when the location flow is received and if it is different from the previous value, generate the data flow to the emergency vehicle status store interface process, adding the current date and time to the received location data;
- (c) when the status flow is received, if it shows that the vehicle is on its way to an emergency incident, then simultaneously with (b) output the data flow requesting local vehicle preemption to the indicator control processes in the Manage Traffic function.

#### **5.3.4 Assess Response Status**

Overview: This process shall assess the status of emergency vehicles that are responding to an incident. In making its assessment, the process shall use data from the process managing a store of vehicle status, plus data from the emergency vehicle driver interface process. The process shall send the results of the assessment to the process responsible for managing emergency and emergency response information and update the store of vehicle status.

Data Flows: All input data flows are unsolicited and the output flows are solicited with the exception of the following solicited input flow, which contains data requested from the process managing the data store of emergency vehicle status data:

(a) 'emergency\_vehicle\_status\_data\_for\_assessment';

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the input from the driver is received, use the data it contains to request the relevant emergency vehicle status data from the store interface process;
- (c) update the status using the input received from the driver and generate the flow to the process that manages emergency responses;
- (d) send the revised emergency vehicle status data to the store interface process.

#### **5.3.5 Provide Emergency Personnel Interface**

Overview: This process shall provide an interface for emergency personnel operating emergency vehicles, through which data can be exchanged with other processes in the Manage Emergency Services function. It shall support the exchange of incident data to which responses are being made by emergency personnel. This process shall include the ability to exchange information between the personnel and the care facility - either dispatch orders, status of the facility, or status of the patient. The process shall support inputs from emergency personnel in both audible and manual forms, with outputs being available in both audio or visual forms. The visual form may include display and hardcopy formats. Both inputs and outputs shall be provided in such a way that while alerting the driver to the information they contain, they shall in no way impair the driver's ability to operate the vehicle in a safe manner.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received from emergency personnel, generate the appropriate output flows identified above and send them to the dispatch and response status monitoring processes;
- (c) when input is received from the dispatch process, generate the corresponding output to emergency personnel.

### **5.3.6 Maintain Vehicle Status**

Overview: This process shall maintain a data store of the current status of all emergency vehicles available for dispatch and that have been dispatched. It shall provide data from the store on request from other processes and shall update the contents of the store with new data received from other processes. This process shall output probe data, either traffic information or environmental readings to the Manage Traffic function. The process shall output the status of a vehicle to the process responsible for vehicle tracking for as long as it is on its way to an incident, to update ETA estimates and enable local vehicle preemption to be given at intersections, if that mode of preemption is chosen and granted.

Data Flows: The input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for the receipt of the input flows listed above;
- (b) when either the data request or data needed flows is received, read the requested data from the store and send it to the requesting process;
- (c) when either of the data flows containing updated or changed vehicle status data is received, load the new data into the data store, overwriting the existing data for the vehicle;
- (d) when the new status data shows that a vehicle is on its way to an incident, output the vehicle status data to the processes responsible for vehicle tracking and vehicle dispatch;
- (e) when the new status data shows that a vehicle is no longer on its way to an incident, output the status data to the process responsible for vehicle tracking, but do not send any further status updates until the condition in (d) is again satisfied;
- (f) manage the data in the store of emergency vehicle status data, retrieving or writing individual records for one or more emergency vehicles, as required.

### **5.3.7 Provide Emergency Vehicle Route**

Overview: This process shall calculate and assign emergency vehicle routes for incident assistance upon request. This process shall provide an interface to the care facilities to which emergency vehicles may be routed. This care facility interface shall be used to decide which care facility is open and ready to receive patients. This process shall interface with a map update provider to maintain an accurate digital map for routing purposes. Once the route is calculated the route is provided to the dispatch function and a record of the assigned route is provided to the assessment function.

Data Flows: The inputs are unsolicited and the outputs are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the request for a route listed above;
- (b) when the flows in (a) are received, and the requested route involves a care facility generate an outputs identified above to request the status of the care facility, monitoring for the receipt of any reply data;
- (c) when the care facility status data is received, generate the emergency vehicle route and send it back to the requesting function and send a notification of the assigned route to the assessment function;
- (d) periodically request and receive updates to the digital map used to generate the routes.

#### **5.4.1 Process TM Detected Violations**

Overview: This process shall manage the details of high occupancy vehicle (HOV) lane use, wrong-way vehicle detection in reversible lanes, and pollution violations reported by the Manage Traffic function. The process shall use the parameters in the store of traffic management (TM) violation (enforcement) data to obtain the vehicle registration data from the appropriate State Department of Motor Vehicles (DMV) office, before sending all of the received information to the correct law enforcement agency. This process shall also maintain the TM enforcement data store, entering all information received from other processes.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'hov\_lane\_violation';
- (b) 'vehicle\_pollution\_alert'.

Solicited Input Processing: This process shall receive the following data flow as a result of requests for data retrieval from the local data store:

- (a) 'enforcement\_data\_for\_TM'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to the DMV terminator:

- (a) 'fdmv-traffic\_violation\_state\_identity';
- (b) 'fdmv-traffic\_violation\_vehicle\_registration'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'tdmv-traffic\_violation\_identity\_code';
- (b) 'tdmv-traffic\_violation\_vehicle\_license';
- (c) 'tea-traffic\_violation\_data';
- (d) 'enforcement\_data\_for\_TM'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when either unsolicited input is received, use this data to generate the output requests to the DMV terminator, and enter this data in the local data store;
- (c) when the solicited input flows from the DMV terminator have been received, use the data received in (b) and the contents of the TM data store to generate the traffic violation output to the law enforcement agency, and enter the new data in the local data store;
- (d) manage the data in the store of traffic management violation data.

## 5.4.2 Process Violations for Tolls

Overview: This process shall manage the details of toll payment violations reported by the Provide Electronic Payments Services function. The process shall use the parameters in the store of toll payment violation (enforcement) data to obtain the vehicle registration data from the appropriate State Department of Motor Vehicles (DMV) office (or alternate source) for vehicles that are not equipped with a tag, before sending all of the received information to the correct law enforcement agency. This process shall also maintain the toll payment enforcement data store, entering all information received from other processes.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flow:  
(a) 'toll\_violation\_information'.

Solicited Input Processing: This process shall receive the following data flow as a result of requests for data retrieval from the local data store:  
(a) 'enforcement\_data\_for\_tolls'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to the DMV terminator:  
(a) 'fdmv-toll\_violation\_state\_identity';  
(b) 'fdmv-toll\_violation\_vehicle\_registration'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'tdmv-toll\_violation\_identity\_code';  
(b) 'tdmv-toll\_violation\_vehicle\_license';  
(c) 'tea-toll\_violation\_data';  
(d) 'enforcement\_data\_for\_tolls'.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor for receipt of the unsolicited input flow listed above;  
(b) when the unsolicited input is received, use this data to generate the output requests to the DMV terminator;  
(c) when the solicited input flows from the DMV terminator have been received, use the other data received in (b) and the contents of the toll payment violation (enforcement) data store to generate the toll violation output to the law enforcement agency, and enter the new data in the local data store;  
(d) manage the data in the store of toll payment violation data.

#### **5.4.4 Process Fare Payment Violations**

Overview: This process shall manage the details of fare payment violations reported by the Provide Electronic Payments function. The process shall use the parameters in the store of fare payment violation (enforcement) data to process and send the data to the correct law enforcement agency. This process shall also maintain the fare payment enforcement data store, entering all information received from other processes.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flow:  
(a) 'fare\_violation\_information'.

Solicited Input Processing: This process shall receive the following data flows as a result of requests for data retrieval from the local data store:  
(a) 'enforcement\_data\_for\_fare\_payment'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above input being received:  
(a) 'tea-fare\_payment\_violation\_data';  
(b) 'enforcement\_data\_for\_fare\_payment'.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor for receipt of the unsolicited input flow listed above;  
(b) when the unsolicited input is received, use this data and the contents of the data store to generate the fare payment violation data to be sent to the law enforcement agency, and enter the new data in the local data store;  
(c) manage the data in the store of enforcement data for fare payment violations.

#### **5.4.5 Process Vehicle Fare Collection Violations**

Overview: This process shall manage the details of fare collection violations reported by the Manage Transit function that have taken place on-board a transit vehicle. The process shall use the parameters in the store of vehicle fare collection violation (enforcement) data to process and send the information to the correct law enforcement agency. This process shall also maintain the vehicle fare collection enforcement data store, entering all information received from other processes.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flow:  
(a) 'fare\_collection\_vehicle\_violation\_information'.

Solicited Input Processing: This process shall receive the following data flow as a result of requests for data retrieval from the local data store:  
(a) 'enforcement\_data\_for\_vehicle\_fare\_collection'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'tea-fare\_collection\_vehicle\_violation\_data';  
(b) 'enforcement\_data\_for\_vehicle\_fare\_collection'.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor for receipt of the unsolicited input flow listed above;  
(b) when the unsolicited input is received, use this data and the contents of the data store to generate the vehicle fare collection violation data to be sent to the law enforcement agency, and enter the new data in the local data store;  
(c) manage the data in the store of enforcement data for vehicle fare collection.



### **5.4.7 Process Roadside Fare Collection Violations**

Overview: This process shall manage the details of fare collection violations reported by the Manage Transit function that have taken place at the roadside, i.e., at a transit stop. The process shall use the parameters in the store of roadside fare collection violation (enforcement) data to process and send the information to the correct law enforcement agency. This process shall also maintain the roadside fare collection enforcement data store, entering all information received from other processes.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flow:  
(a) 'fare\_collection\_roadside\_violation\_information'.

Solicited Input Processing: This process shall receive the following data flow as a result of requests for data retrieval from the local data store:  
(a) 'enforcement\_data\_for\_roadside\_fare\_collection'.

Solicited Output Processing: This process shall provide the following output flow as a result of the above input being received:  
(a) 'tea-fare\_collection\_roadside\_violation\_data';  
(b) 'enforcement\_data\_for\_roadside\_fare\_collection'.

Functional Requirements: This process shall meet the following functional requirements:  
(a) continuously monitor for receipt of the unsolicited input flow listed above;  
(b) when the unsolicited input is received, use this data and the contents of the data store to generate the roadside fare collection violation data to be sent to the law enforcement agency, and enter the new data in the local data store;  
(c) manage the data in the store of roadside fare collection violation (enforcement) data.

### **5.5 Update Emergency Display Map Data**

Overview: This process shall provide updates to the store of digitized map data used as the background for displays of incidents and emergencies produced by processes in the Manage Emergency Services function. The process shall obtain the new data from a specialist data supplier or some other appropriate data source, on receiving an update request from the emergency system operator interface process within the Manage Emergency Services function.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flow:  
(a) 'request\_emergency\_display\_update'.

Solicited Input Processing: This process shall receive the following data flow as a result of output being sent to external functions:  
(a) 'fmup-emergency\_display\_update'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'tmup-request\_emergency\_display\_update';  
(b) 'map\_data\_for\_emergency\_display'.

Functional Requirements: This process shall meet the following requirements:  
(a) continuously monitor for the receipt of the unsolicited data flow shown above;  
(b) when the data flow in (a) is received, generate the request for emergency display update from the map update provider (mup) and continuously monitor for receipt of the solicited input data flow;  
(c) when the flow in (b) is received, output this data to the map data for emergency display data store;  
(d) be capable of receiving the input data in a variety of formats and converting it into a single format suitable for use with the store of digitized map data;  
(e) manage the data in the store of digitized map data.

## 5.6 Manage Emergency Services Data

Overview: This process shall collect emergency service data, emergency vehicle management data, emergency vehicle data, and incident data. It shall distribute this data to the Manage Archive Data Request where it can be archived and accessed upon request or upon receipt of fresh data.

All inputs to this process are unsolicited, and all outputs are solicited, except that the 'em\_archive\_status' is a solicited input.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when any of the unsolicited data inputs shown above is received, the process shall store them in the data store along with meta data (data attributes about the data), and update the catalog;
- (c) when the unsolicited input from the emergency system operator is received, the process shall update the data store accordingly;
- (d) when the request for emergency archive data is received, the process shall immediately generate the solicited output shown above from the data store;
- (e) the process should then receive the emergency archive status solicited input and send this status to the emergency system operator;
- (f) data shall only be sent to the source from which the data request originated;
- (g) before output, the process shall put the data into a format that is easily read and interpreted by external processes and can also be read by travelers and users with the minimum of further processing.

### **6.1.1 Provide Trip Planning Information to Traveler**

Overview: This process shall obtain all the information needed to fulfill the traveler's request for a trip. The process shall support the request for trips that require the use of one or more modes of transport, and shall use the preferences and constraints specified by the traveler in the trip request, plus data from the store of trip planning parameters, to select the most appropriate modes. It shall send details of the trip requirements to the specialized processes that provide route information for the different modes of transport. When route data is received back from these processes, this process shall ensure that the whole trip is covered by one coherent route for which all the data such as costs, arrival times, and modal change points are known. The information provided to the traveler by the process shall be sufficient to enable the traveler to understand the routing, modes and cost of the trip. The trip information shall be stored for possible use in subsequent trip confirmation. The process also includes parking lot data. This data is used in transactions requiring electronic payment of parking lot services, as well as for a traveler making a parking lot reservation. This process shall exchange all input and output data from and to the traveler with the appropriate traveler interface process. The traveler shall send parking lot data, traveler trip requests, and traveler current condition requests to the archival process.

Data Flows: The traveler trip request input data flow is unsolicited. All output flows are solicited and will themselves generate input flows. The following input flows contain data requested from or written to data stores:

- (a) 'trip\_information', write only;
- (b) 'trip\_planning\_parameters', read only.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the traveler trip request input flow listed above;
- (b) when the input flow in (a) is received, output data flows to the data archival process and other processes requesting various types of routes, rideshare information, demand responsive trip requests, according to the preferences and constraints in the traveler's trip request and the parameters governing trip selection contained in the read only data store identified above;
- (c) when the data has been returned, construct the trip and ensure that there are no breaks, i.e. where mode changes are involved, each segment begins and ends at a valid modal interchange point;
- (d) if any of the segments do not join up, change the preferences and constraints and repeat (b) until a correct match is produced;
- (e) in parallel with (c) and (d) compute the total cost of the trip, including all tolls, parking lot charges, transit fares, and other costs;
- (f) when all calculations are complete, store the trip information in the local store for use if the traveler decides to confirm and then send the trip data to the process that provides the traveler interface using the traveler trip information output flow defined above;
- (g) when a traveler requests current conditions or parking lot data in the data store is updated, output this information to the data archival process.

## 6.1.2 Confirm Traveler's Trip Plan

Overview: This process shall confirm a trip previously requested by a traveler and any financial transactions that this may require. The process shall base the trip confirmation upon information created by the process responsible for trip planning and stored locally. Confirmation details shall be sent to specialized processes (such as those responsible for demand responsive transit, ridesharing, etc.) to make reservations for their services. The response to these reservation requests and any necessary payment transactions shall be sent to the traveler. This process shall exchange all input and output data to and from the traveler via the appropriate traveler interface process. The trip confirmation shall be sent to the archival process.

Data Flows: The traveler trip confirmation input data flow is unsolicited. All output flows are solicited and will themselves generate input flows. The input flows 'trip\_information' and 'trip\_planning\_parameters' contain data(implicitly) requested from data stores.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the traveler trip confirmation input flow listed above;
- (b) when the input flow in (a) is received, send the confirmation to the data archival process and obtain the data about the confirmed trip from the local trip information data store;
- (c) output data flows to other processes requesting confirmation of various services and if required, advanced payment of tolls, parking lot charges, transit fares, and other costs;
- (d) when all reservation and payment confirmations have been received, confirm the traveler's trip by sending the traveler trip confirmation information data flow identified above to the traveler interface process.

### 6.1.3 Manage Multimodal Service Provider Interface

Overview: This process shall collect data about services that are available to travelers from multimodal transportation service providers. These suppliers shall be those that provide travel services that are not part of regular transit or demand responsive transit operations, e.g., suppliers of bicycle and pedestrian facilities and services and heavy rail operators, and may not involve surface transportation, e.g., ferry and airline operations. The process shall provide data formatted for use as part of a traveler's multimodal trip, and shall support subsequent confirmation of any portion provided by the Multimodal Transportation Service Provider.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'multimodal\_service\_confirm';
- (b) 'multimodal\_service\_data\_request'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to the multimodal transportation service provider:

- (a) 'fmtsp-air\_services';
- (b) 'fmtsp-ferry\_services';
- (c) 'fmtsp-multimodal\_service\_confirmation';
- (d) 'fmtsp-rail\_services';
- (e) 'fmtsp-non\_motorized\_services'.

Solicited Input/Output Processing: This process shall send and receive the following data flows as a means of reading data from and writing data to a data store:

- (a) 'multimodal\_service\_details\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'multimodal\_service\_confirmation';
- (b) 'multimodal\_service\_data\_response';
- (c) 'tmtsp-confirm\_multimodal\_service';
- (d) 'tmtsp-ferry\_services\_request';
- (e) 'tmtsp-rail\_services\_request';
- (f) 'tmtsp-air\_services\_request';
- (g) 'tmtsp-non\_motorized\_services\_request'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the first input is received, request confirmation for the services that were specified;
- (c) when a response to (b) is received, generate the first output flow identified above with the result of the confirmation request;
- (d) when the second input is received, read data from the store of multimodal transportation service details to see if the required data has already been provided;
- (e) if the data in (d) does not contain the required services or has been stored for a time that exceeds a locally determined threshold, generate the fourth to sixth solicited output data flows shown above that correspond to the modes in the input, including the required destination and arrival times;
- (f) when the corresponding solicited inputs (first, second and fourth in the list shown above) are received, load the data into the data store;
- (g) generate last solicited output data flow shown above using either the data read from the store or that provided by the multimodal transportation service provider.

#### **6.1.4 Provide ISP Operator Interface for Trip Planning Parameters**

Overview: This process shall manage the data store containing parameters used by the trip planning processes. These parameters shall govern the way in which multimodal trips are planned by other processes within Provide Trip Planning Services. This process shall accept inputs from the ISP Operator to define or update trip planning parameters. This process shall output these trip planning parameters to the ISP Operator.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'fispo-trip\_planning\_parameters\_request';
- (b) 'fispo-trip\_planning\_parameters\_update'.

Solicited Input Processing: This process shall receive the following data flows as a result of requests for data retrieval from local data stores:

- (a) 'trip\_planning\_parameters'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'tispo-trip\_planning\_parameters';
- (b) 'trip\_planning\_parameters'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the first input is received, read the data from the store and generate the second output identified above;
- (c) when the second input is received, update the contents of the store with the new data.

#### **6.1.5 Collect Service Requests and Confirmation for Archive**

Overview: This process shall receive all traveler requests, such as requests for traffic and transit information, requests for current conditions such as weather, trip requests, guidance route requests, advisory requests, yellow page information requests, and service confirmations. These requests shall be stored in the 'service\_req\_and\_confirm\_data' data store and output to the traveler information data archive. The process shall run when a new request or confirmation is received from an external source.

Data Flows: All input data flows are unsolicited. All output flows are solicited and will themselves generate input flows.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of any of the input flows listed above;
- (b) when one of the input flows in (a) is received, write the data to the service\_req\_and\_confirm\_data store;
- (c) output the data flow to the traveler information data archival process.

## **6.1.6 Manage Traveler Info Archive Data**

Overview: This process shall accept traveler information service requests and confirmations, parking management information, payment transaction data, rideshare requests, commercial and non-commercial probe data, route guidance data, and origin/destination data, and store it in its local traveler info data archive data store, together with a catalog to describe the data. When requested by the Manage Archive Data function, this information will be sent to that function. The process shall also provide a control interface to the ISP Operator, responding with the status received from the requester of the archive. The process shall run when a request for data or a catalog is received from an external source, when a command is received from the ISP Operator, or when fresh data is received.

Data Flows: All input data flows are unsolicited. All output flows are solicited and will themselves generate input flows.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of any of the input flows listed above;
- (b) when data to be archived is received, write the data to the traveler\_info\_data\_archive and append its attributes;
- (c) when a request for the archive catalog is received, read the traveler\_info\_data\_archive for the catalog and output it to the Manage Archive function;
- (d) when a request for the archive data is received, read the traveler\_info\_data\_archive and output the data requested to the Manage Archive function;
- (e) when archive status is received, output the status to the ISP Operator;
- (f) when a command is received from the ISP Operator, process the data in the traveler\_info\_data\_archive as directed.

### **6.2.1.1 Collect Traffic Data for Advisory Messages**

Overview: This process shall collect and fuse traffic data that will be used to create broadcast or advisory messages to travelers. The input data for this process shall consist of historical, current, and predicted traffic and planned event data. The process shall extract from the data those elements appropriate for advisory or broadcast messages and load it into the store of 'traveler\_traffic\_information\_data'. The data can be provided to the process either via direct request from the process or as a result of periodic (unrequested) updates.

Data Flows: All input data flows are solicited with the exception of those listed above that contain prediction and planned events data. All output flows are solicited. Read and write access to the local store into which the input data is loaded after fusion is provided through the 'traveler\_traffic\_information\_data' data store.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above containing prediction data and planned events data;
- (b) at locally determined times, generate the data output flows to processes in this and other functions, as listed above, including traffic information for advisory and broadcast messages;
- (c) collect the data returned as a result of (b) and load it with that received in (a) into the data store of traveler traffic information, fusing it with the data already present, deleting old data, e.g., that relating to incidents that are completed, etc.

### **6.2.1.2 Provide Traffic and Transit Advisory Messages**

Overview: This process shall provide advisory data to users in vehicles (drivers or transit users) as a result of a request from the driver or transit user. (e.g., This process supports a request/response type of exchange with the user.) The advisory information is extracted from the data stores of traveler traffic and transit information by other processes, then sent to this process. This process shall have the capability to filter the advisory data and store it so that the output only contains data that is relevant to the current location of the vehicle from which the request was made. When the user requests location specific data, the vehicle's location shall be provided to the process in the request message. Advisory data requests shall be sent to the data archival process.

Data Flows: The input data flow requesting advisory information is unsolicited. All output flows and the other input flows are solicited with the exception of the following:

- (a) 'traveler\_traffic\_information\_advisory\_data' data flow - which contains data requested from a store;
- (b) 'traveler\_transit\_information\_advisory\_data' data flow - which contains data requested from a store.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flow requesting advisory data listed above;
- (b) when the input in (a) is received, read the requested data from the store sent from the processes identified above, send the request to the data archival process, and generate the advisory data output flow identified above.

### **6.2.1.3 Collect Transit Data for Advisory Messages**

Overview: This process shall collect and fuse transit advisory data that will be used to create broadcast or advisory messages to travelers. The process shall extract from the data those elements appropriate for advisory or broadcast messages and load it into the 'traveler\_transit\_information\_data' store. The data can be provided to the process either via direct request from the process or as a result of periodic (unrequested) updates. The process shall fuse all the received data into a coherent set, which is loaded into a 'traveler\_transit\_information\_data' store for access by other processes.

Data Flows: All input data flows are solicited as are all output flows. Read and write access to the local store into which the input data is loaded after fusion is provided through the 'traveler\_transit\_information\_data' data store.

Functional Requirements: This process shall:

- (a) at locally determined intervals, generate the data output flows to processes in this and other functions, as listed above, including traffic information for advisory and broadcast messages;
- (b) collect the data returned as a result of (a) and load it into the local data store, fusing it with the data already present, deleting old data, for example that relates to incidents that are completed.



#### **6.2.1.4 Provide Traffic and Transit Broadcast Messages**

Overview: This process shall receive advisory data from stores of traveler traffic and transit information extracted by other processes at locally determined intervals and send it out to drivers or transit users in vehicles as wide area broadcast messages. The broadcast information is extracted from the data stores of traveler traffic and transit information by other processes, then sent to this process. The content and rate of these messages shall be based upon parameters from the 'broadcast\_parameters\_data' store, which is managed by the ISP operator.

Data Flows: The input data flow requesting advisory information is unsolicited. All output flows and the other input flows are solicited with the exception of the following:

- (a) 'traveler\_traffic\_information\_broadcast\_data' data flow - which contains data requested from a store;
- (b) 'traveler\_transit\_information\_broadcast\_data' data flow - which contains data requested from a store.

Functional Requirements: This process shall:

- (a) at locally determined intervals read the data from the stores sent from the processes identified above and generate the broadcast data output flow identified above;
- (b) the data flow in (a) shall be generated using the filter parameters set up by the ISP operator and retained in a local data store.

#### **6.2.1.5 Provide ISP Operator Broadcast Parameters Interface**

Overview: This process shall provide the interface through which the ISP operator can manipulate data in the 'broadcast\_parameters\_data' store. The data in this store shall be used by another process to define the scope and rate of wide area broadcast messages to vehicles. The process shall provide the ISP operator with the ability to request parameter data output and/or update the data store with new parameter values.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'fispo-broadcast\_data\_parameters\_request';
- (b) 'fispo-broadcast\_data\_parameters\_update'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'parameters\_data\_for\_broadcast\_messages';
- (b) 'tispo-broadcast\_data\_parameters\_output'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the first input is received, read the data from the store of parameters and generate the second solicited output flow identified above;
- (c) when the second input is received, update the data in the store of parameters and send the new broadcast data to another process that provides broadcast messages to travelers, using the first solicited output flow.

#### **6.2.1.6 Collect Environmental Probe Data**

Overview: This process shall collect environmental data (such as air temperature, wind speed, surface temperature, etc.) from vehicle-based sensors or vehicle control systems, aggregate it with measurements from other vehicles, and forward it to the Manage Maintenance and Construction function. This process shall tag all data with quality attributes. When any of the data is provided in analog form, the process shall convert it to digital form and calibrate it.

Functional Requirements: None.

## **6.2.2 Prepare and Output In-vehicle Displays**

Overview: This process shall provide in-vehicle advisory and broadcast data for output to drivers and transit users aboard transit vehicles. The process shall format requests from users for advisory data and output the requests to other processes. The request for advisory data shall allow the user to request only information relevant to the location of the vehicle. The request may be repeated, periodically, or when the vehicle changes location by a distance determined by the implementation. Data broadcast to the driver shall include traffic related data (incidents and link data) as well as data from the vehicle itself. This vehicle data includes vehicle conditions, smart probe data, safety and position warnings, and enhanced vision images. Data broadcast can also include in-vehicle signage messages, which include fixed signage, situational messages, or work zone intrusion warning messages. Safety and warning messages shall be prioritized by the process to supersede advisory and broadcast messages. The process shall also support the transfer of reservation requests from the users in vehicles for other services such as yellow pages, non-motorized transportation information, and event information.

Data Flows: All input data flows are unsolicited with the exception of that requesting input of advisory data. All output flows are solicited.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs other than those from the driver, transit user, or location data are received, generate the output of advisory or broadcast data to the driver identified above;
- (c) when the input from either the driver or the transit user is received, add the current vehicle location and send it as the advisory data request to another process;
- (d) the data returned as a result of (c) shall be output to the driver or transit user depending on the source of the request for advisory information;
- (e) when the broadcast data input is received, it shall be filtered to remove that which is not relevant to the wide area surrounding the vehicle before being output to the driver;
- (f) repeat (c) and (d) for as long as the input is present, every time the vehicle location changes by an implementation distance.

## **6.2.3 Provide Transit User Advisory Interface**

Overview: This process shall provide a data input and output interface for a transit user on-board a transit vehicle. The process shall enable traffic and travel advisory information, plus yellow pages (including non-motorized transportation) information to be requested and output to the transit user. When constructing the outputs the process shall use the data in the store of vehicle display definitions data. In addition to the traveler's request/response for information, broadcast advisories about the imminent arrival of the transit vehicle at the next stop are also displayed for the transit user. The process shall handle all inputs and outputs in such a way that they do not impair the vehicle driver's ability to control the transit vehicle in a manner that is safe to both its occupants, to other road and freeway users, and to pedestrians. The input and output forms shall also include those that are suitable for travelers with physical disabilities.

Data Flows: The input data flow from the transit user is unsolicited. All output data flows are solicited as is the input data flow of traveler advisory information. The data flow 'vehicle\_display\_definitions\_data' provides output template data from a local data store.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flow listed above that is a request from the transit user for advisory information;
- (b) when the input in (a) is received, generate the output information request output data flow identified above;
- (c) when the input data flow of advisory information is received in response to (b), generate the output to the transit user using the template data available from the local data store;
- (d) continue with (b) and (c) for as long as the input from the transit user is present.

#### **6.2.4 Collect Yellow Pages Data**

Overview: This process shall collect and fuse data about yellow pages (including non-motorized transportation) services in order to provide information to users in vehicles. The process shall fuse all the received yellow pages data into a coherent set and loaded into the yellow\_pages\_information\_data store for access by processes in response to requests from users in vehicles.

Data Flows: All input and output data flows are solicited. Read and write access to the local store is provided through the following data flows:  
(a) 'yellow\_pages\_information\_data'.

Functional Requirements: This process shall meet the following functional requirements:  
(a) at locally determined intervals, generate the data output flow to request other (yellow pages) services data, as listed above;  
(b) collect the data returned as a result of (a) and load it into the local data store, fusing it with the data already present.

#### **6.2.5 Provide Driver Information Interface**

Overview: This process shall provide a user interface for a driver through which traffic and travel advisory information can be obtained. The process shall enable traffic and travel advisory information to be requested and output to the driver, and shall also support the automatic output of wide area broadcast information (including in vehicle signage) to the driver. The process shall support output of safety and vision enhancement information to the user. When constructing all outputs the process shall use the vehicle\_display\_definitions\_data store parameters. One purpose of the vehicle\_display\_definitions\_data store is to provide a translation table for road sign and message templates used for in-vehicle display. Part of the input interface provided by the process shall enable the driver to invoke and cancel automatic control of the vehicle including the use of automated highway system (AHS) lanes. The process shall support inputs from the driver in manual or audio form, and shall provide its outputs in audible or visual forms. Visual output may be either in hardcopy, or as a display. Both types of output shall not impair the driver's ability to control the vehicle in a safe manner.

Data Flows: All input data flows are unsolicited. The output flow is solicited as is the input of driver advisory information when it is received in response to driver input. The data flow 'vehicle\_display\_definitions\_data' provides output template data from a local data store.

Functional Requirements: This process shall:  
(a) continuously monitor for receipt of the input flow listed above that is a request from the driver for advisory information;  
(b) when the input in (a) is received, generate the output information request output data flow identified above;  
(c) when the input data flow of advisory information is received in response to (b), generate the output to the driver using the template data available from the local data store;  
(d) continue with (b) and (c) for as long as the input from the driver is present;  
(e) if the request from the driver is for a change in the mode of vehicle automatic control, send the data to another process in the Provide Vehicle Control and Monitoring function using the vehicle control request data flow;  
(f) if the driver advisory information data flow is received as unsolicited input, output the data that it contains immediately.

## **6.2.6 Provide Yellow Pages Data and Reservations**

Overview: This process shall extract data from the yellow\_pages\_information\_data store upon request for data from the driver or a transit user in a vehicle. The data read from the store may be filtered, by the process, so that output only contains that which is relevant to the current location of the vehicle. The process shall also enable the user to make reservations for yellow pages services from a vehicle. Yellow pages advisory requests shall be sent to the data archival process.

Data Flows: The input data flow requesting advisory information is unsolicited. All output flows and the other input flows are solicited with the exception of the following:

(a) 'yellow\_pages\_output' data flow - which contains data stored by another function.

Functional Requirements: This process shall:

(a) continuously monitor for receipt of the input flow requesting advisory data listed above;  
(b) when the input in (a) is received, read the requested data from the store identified above, generate the advisory data output flow identified above, and output the advisory request to the data archival process.

## **6.2.7 Provide Transit Advisory Data On Vehicle**

Overview: This process shall gather transit advisory data and provide it via another process to the transit user on-board a transit vehicle. The interface shall receive requests from the transit user specifying the required destination of a transit service ride and other (yellow pages) type services. The transit user may also request and receive information about the state of traffic on the roadway, as well as transit route and stop data (i.e., traffic and transit advisory data). The advisory information is gathered by another process that manages traveler transit information, then sent to this process upon request for advisory data from the driver or transit user in a vehicle. The process shall filter the data read from the store so that output only contains that which is relevant to the current location of the vehicle from which the request was made. The vehicle's location shall be provided to the process in the request data. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Data Flows: All input data flows are unsolicited and all output flows are solicited except for the following:

Unsolicited output:

(a) other\_services\_vehicle\_request.

Solicited input:

(a) other\_services\_vehicle\_response.

Functional Requirements: This process shall meet the following functional requirements:

(a) continuously monitor for receipt of the input flows listed above;  
(b) when the inputs from the transit user are received, generate the appropriate outputs identified above, prompting the user for any information that has not been supplied;  
(c) when any response flow is received, generate the appropriate output to the transit user to indicate the success or failure of the requested transaction;  
(d) all input and output flows must be encrypted in such a way that it is not possible to determine the transit user's payment information being transmitted, using any form of digital or analog encryption techniques.

### **6.3.1 Get Traveler Request**

Overview: This process shall receive input data from a traveler located at a kiosk and send requests to the appropriate processes within the Provide Driver and Traveler Services function for further processing. The process shall provide support for trip planning, traffic, transit, yellow pages services and event information requests, trip confirmation, yellow pages confirmation, and payment requests. The actual interface to the traveler is provided through a separate process, which creates the input flow to this process.

Data Flows: The input data flow is unsolicited and all output flows are solicited.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the traveler trip planning input flow listed above;
- (b) when the flow in (a) is received, extract the data and send it to the appropriate processes in the Provide Driver and Traveler Services function;
- (c) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **6.3.2 Inform Traveler**

Overview: This process provides the traveler (located at a kiosk) with data about all requested trip, traffic, transit, yellow pages services or event information, confirmation of any requested reservations, and payments made as part of confirmed trip plans. The data is sent by the process to an interface process that is responsible for its actual output to the traveler. This data may include digitized map data to act as the background to the output when the data is to be shown in a suitable format. This process may request data from other ITS functions or data may be sent to this process as a result of requests from another process.

Data Flows: All output flows are solicited and all input data flows are unsolicited with the exception of the following:

- (a) 'traffic\_data\_for\_kiosks' - which is received as a result of output being sent to another process;
- (b) 'transit\_deviations\_for\_kiosks' - which is received as a result of output being sent to another process;
- (c) 'transit\_services\_kiosk\_request' - which is received as a result of output being sent to another process;
- (d) 'map\_data\_for\_traveler\_displays' - which contains data requested from a data store.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flows listed above that are not details of transit services, traffic data and the display map data;
- (b) when any of the flows in (a) are received, retrieve the relevant digitized display map data from the local store and send the combined data to the traveler interface process;
- (c) when the flow received in (a) contains a request for transit or traffic data, send the request to the relevant process in the Manage Transit or Manage Traffic function;
- (d) the input data received as a result of (c) shall be combined with the relevant digitized display map data from the local store and sent to the traveler interface process;
- (e) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **6.3.3 Provide Traveler Kiosk Interface**

Overview: This process shall provide an interface at a kiosk through which travelers can input data and can receive data. The functions that the traveler can perform include plan and confirm trips, obtain current traffic and transit information, and declare emergencies. The process shall support the inclusion of yellow pages (including non-motorized transportation) services such as lodging, restaurants, theaters, bicycle facilities and other tourist activities as a part of trip planning and confirmation. The process shall be able to store frequently used data, such as the kiosk location, to reduce the amount of input needed by the traveler for each request. The process shall also carry out input data verification and require input confirmation before passing any of the traveler data to other processes (except when an emergency is being declared). The traveler's payment information shall be obtained by this process from another process specially designed for that purpose. The process shall support traveler inputs in manual or audio form, and shall provide its outputs in audible or visual forms consistent with a kiosk. These forms shall include those that are suitable for travelers with hearing or vision physical disabilities.

The process shall enable viewing of data that has been previously output. Where it is appropriate, the process shall use the kiosk's location to filter data being displayed to only show information relevant to the kiosk's location, or to a specific location requested by the user.

Data Flows: All input data flows are unsolicited and all output flows are solicited, with the exception of the 'traveler\_regular\_data' data flow which contains data requested from or written to a data store.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flows from the traveler listed above;
- (b) when any of the inputs in (a) are received, check for content and if necessary utilize data from the local store identified above;
- (c) generate the output identified above and load the requested data into the local data store;
- (d) continually monitor the data in the local store and compare it with that being input by travelers, deleting any data from the store which is not frequently used;
- (e) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted using any form of digital or analog techniques.

### **6.3.4 Update Traveler Display Map Data at Kiosk**

Overview: This process shall provide updates to the digitized map data used as the background for displays of trip, traffic and transit information. This data shall be suitable for use in kiosk displays. The process shall obtain the new data from map data suppliers or some other appropriate data source.

Unsolicited Output Processing: This process shall provide the following output flows regardless of any inputs being received:

(a) 'tmup-request\_traveler\_display\_update'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to external functions:

(a) 'fmup-traveler\_display\_update'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above solicited input being received:

(a) 'map\_data\_for\_traveler\_displays'.

Functional Requirements: This process shall:

- (a) send out the request for new data from the specialized digital map data supplier at periodic intervals (e.g. once per month) automatically so as to provide an up to date map display using the unsolicited output data flow shown above;
- (b) as a result of the output of the data flow in (a) continuously monitor for receipt of the solicited input data flow shown above;
- (c) when the flow in (b) is received, output the second solicited output data flow shown above;
- (d) be capable of receiving the input data in a variety of formats and converting it into a single format suitable for use with the store of digitized map data.

## 6.5.1 Collect and Update Traveler Information

Overview: This process shall collect and update data about incidents, road construction, weather, events and yellow pages data (including non-motorized transportation). This data shall be obtained by the process from other ITS functions and from outside sources such as weather services, yellow pages service providers and the media. The process shall load the data into a local store for use by the process that provides yellow pages information and reservations.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'fws-current\_weather\_observations';
- (b) 'fws-weather\_forecasts';
- (c) 'yellow\_pages\_new\_data\_request';
- (d) 'yellow\_pages\_update\_request';
- (e) 'event\_information\_request';
- (f) 'road\_weather\_info\_for\_isp'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval from local data stores:

- (a) 'incident\_information';
- (b) 'yellow\_pages\_service\_provider\_data', which contains data requested from a data store;
- (c) 'fm-traveler\_information';
- (d) 'fypsp-yellow\_pages\_data';
- (e) 'fevp-event\_information\_for\_travelers';
- (f) 'tourist\_information', which contains data requested from a data store;
- (g) 'fstws-surface\_trans\_weather\_observations';
- (h) 'fstws-surface\_trans\_weather\_forecasts'.

Unsolicited Output Processing: This process shall provide the following output flows regardless of any inputs that are received:

- (a) 'incident\_information\_request';
- (b) 'tm-traveler\_information\_request';
- (c) 'typsp-yellow\_pages\_info\_request';
- (d) 'tevp-event\_information\_request';
- (e) 'tstws-trans\_weather\_info\_request';
- (f) 'current\_conditions'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'tourist\_information', which contains data written to a data store;
- (b) 'typsp-yellow\_pages\_info\_request';
- (c) 'yellow\_pages\_update\_response';
- (d) 'event\_information\_for\_travelers'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when either of the weather service inputs are received, load the data into the store of tourist information using the solicited output flow shown above;
- (c) when either of the yellow pages or event information data flows are received in (a) send the yellow pages or event information data request shown above in the list of unsolicited output flows;
- (d) when the response to (c) is received in the solicited yellow pages or event information input flow, load the data into the store of tourist information using the solicited output flow shown above;
- (e) before loading data into the store of tourist information, read the current data from the store and amalgamate it with the new data;
- (f) be responsible for the management of the data in the store of tourist information, using the most appropriate mechanism(s) such as a relational database, for storing the data;
- (g) use the most appropriate mechanism(s) such as relational database, to read data from the store of information and service provider data identified above.



## 6.5.2 Provide Traveler Yellow Pages Information and Reservations

Overview: This process shall provide information and reservation services obtained from yellow pages service providers. The process shall provide the information and reservation data so that it can easily form part of a traveler's information request or trip planning activities. The process shall be able to request additional yellow pages information if the process cannot find the required data in the tourist\_information data store. The process shall send requests for payment to a process in the Provide Electronic Payment Services function for action, and shall send the response back to the process from which the payment request was received. The traveler's yellow pages requests shall be sent to the data archival process.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'yellow\_pages\_reservation\_request';
- (b) 'traveler\_payment\_information';
- (c) 'traveler\_transaction\_request';
- (d) 'traveler\_personal\_payment\_information';
- (e) 'traveler\_personal\_transaction\_request';
- (f) 'traveler\_personal\_yellow\_pages\_information\_request';
- (g) 'traveler\_yellow\_pages\_information\_request';
- (h) 'yellow\_pages\_data\_request'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval from local data stores:

- (a) 'fydsp-transaction\_confirmation';
- (b) 'traveler\_other\_services\_payment\_result';
- (c) 'yellow\_pages\_update\_response', which contains data requested from a data store.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'yellow\_pages\_reservation\_confirmation';
- (b) 'traveler\_other\_services\_payment\_request';
- (c) 'traveler\_personal\_yellow\_pages\_data';
- (d) 'traveler\_yellow\_pages\_data';
- (e) 'typsp-transaction\_request';
- (f) 'yellow\_pages\_update\_request';
- (g) 'yellow\_pages\_data';
- (h) 'traveler\_yellow\_pages\_requests\_for\_archive'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the inputs are received, generate the solicited outputs as described below;
- (c) unsolicited inputs (a) and (b) together generate solicited outputs (a) and (e), which in turn generate solicited inputs (b) and (a), which then generate solicited output (b);
- (d) unsolicited inputs (c) and (e) will each generate solicited outputs (a) and (f), which in turn generate solicited inputs (b) and (a), which then generate solicited output (b);
- (e) unsolicited inputs (f) and (g) generate solicited input (c), then the solicited outputs (d) and (e) respectively;
- (f) unsolicited input (h) generates solicited input (c), then the solicited output (g);
- (g) if in (e) or (f) the required data is not in the solicited input, then generate solicited output (f) and repeat the read of the input data;
- (h) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques;
- (i) unsolicited inputs (c), (e), (f), and (g) will each generate solicited output (h), which in turn will be sent to the data archival process.

### **6.5.3 Register Yellow Pages Service Providers**

Overview: This process shall register yellow pages service providers. The process shall accept requests for registration from the providers and shall pass the data to a process in the Provide Electronic Payment Services function for action. The process shall send the result of this action to the provider, and if successful, shall send a request for the process that manages the contents of the store of tourist information to request data from the provider. The details of the provider shall also be loaded into the store used by that process, so that data from the provider can readily be obtained in the future. This process shall perform updating of the yellow pages service provider details.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'fydsp-request\_provider\_registration';
- (b) 'fydsp-provider\_profile\_update'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval:

- (a) 'yellow\_pages\_service\_provider\_registration\_response'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'yellow\_pages\_service\_provider\_data', which is data output to a store;
- (b) 'yellow\_pages\_service\_provider\_registration\_request';
- (c) 'typsp-provider\_update\_confirm';
- (d) 'yellow\_pages\_new\_data\_request'.

Functional Requirements: This process shall :

- (a) continuously monitor for receipt of the unsolicited input flow listed above;
- (b) when the input in (a) is received, generate the solicited output in (b) identified above;
- (c) when as a result of (b), the solicited input flow is received, generate the solicited outputs identified above (a), (c) and (d);
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **6.5.4 Provide Traveler Event Information**

Overview: This process shall provide information obtained from event promoters. The process shall provide the information so that it can easily form part of a traveler's information request or trip planning activities. The process shall be able to request additional event information if the process cannot find the required data in the tourist\_information data store maintained by another process. The traveler's event information requests shall be sent to the data archival process.

Data Flows: The output flows are solicited. The input data flows from the traveler are unsolicited, however, the event information results from a request to another process.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flows from the traveler listed above;
- (b) when the input in (a) is received, send the request data flow to another process to obtain the event information, and then return the information to the traveler.

### 6.6.1 Provide Multimodal Route Selection

Overview: This process shall manage the creation of multimodal routes (e.g. routes where travelers use one or more transportation modes) in response to traveler's trip or route requests. It shall support on-line route guidance for travelers using personal devices, route guidance for vehicles, selection of specialized vehicle based routes for other ITS functions, (such Manage Commercial Vehicles), and selection of multimodal routes in response to trip planning requests from travelers. The multimodal routes provided by the process shall take account of the traveler's preferences and constraints. Constraints can include the access needs of those with disabilities. Preferences can include minimizing waiting time at modal interchange points, level of traveler security, or minimum cost. Trip requests, traveler route requests, and traveler route acceptances shall be sent to the data archival process.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'cv\_route\_request';
- (b) 'fws-current\_weather\_observations';
- (c) 'fws-weather\_forecasts';
- (d) 'planned\_events';
- (e) 'traveler\_route\_request';
- (f) 'trip\_request';
- (g) 'fstws-surface\_trans\_weather\_observations';
- (h) 'fstws-surface\_trans\_weather\_forecasts'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes:

- (a) 'other\_route';
- (b) 'paratransit\_route\_response';
- (c) 'transit\_route';
- (d) 'traveler\_route\_accepted';
- (d) 'vehicle\_route'.

Solicited Output Processing: All outputs are solicited.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) priority shall be given to the response to requests for emergency vehicle routes and shall take precedence over all other activities;
- (c) the response to any input that is a route request shall be to pass on the request to the appropriate Route Selection facility, bearing in mind the originator of the route (type of vehicle, or traveler, trip plan or route request) plus the preferences and constraints specified in the input data;
- (d) when an emergency vehicle route has been determined, data showing the links, and the intersections along the route, including expected arrival times shall be sent to the Manage Traffic function to enable the current traffic management strategy to be modified to give the emergency vehicles a traffic control preemption;
- (e) when trip or traveler guidance requests are received, the process shall be capable of automatically making several route requests of the specialized route selection facilities until it has determined the best multimodal route, bearing in mind the preferences and constraints included in the original request;
- (f) the use of multimodal routes shall be aimed at minimizing the use of the private car in so far as this is allowed by the preferences and constraints in the trip or traveler guidance request;
- (g) the requirements of (e) and (f) above shall be superseded by the need to keep waiting time at transfer points to a minimum and non-existent for such things as late night travel or other situations where personal security may be a problem;
- (h) if the process finds that a route cannot be provided within the preferences and constraints specified in the input request, the process shall produce a response which shall contain details of where the route cannot be selected;
- (i) trip\_request, traveler\_route\_request, or traveler\_route\_accepted will each generate outputs to the data archival process.

### 6.6.2.1 Calculate Vehicle Route

Overview: This process shall calculate trip planning and real-time dynamic guidance routes for all types of vehicles. The route data provided by the process in response to requests from vehicles using infrastructure based in-vehicle guidance shall only contain data necessary for the vehicle to provide guidance (since the data is intended for use by an in-vehicle navigation unit). The route provided for trip planning purposes shall contain data in a form which can be presented to a user via display (or alternatively in audio form). The process shall select the route according to the data included in the route request. Data provided by the requesting process includes preferences and constraints. The process shall have the capability of using current and/or predicted conditions of the road network in route calculation. The process shall have the capability of including additional factors such as current or forecasted weather in the calculation of route. If the process cannot find the data it needs in the route\_segment\_details\_data store, it shall request the process responsible for providing route calculation data to obtain it from the appropriate source. The process shall have the capability of outputting routes for special priority vehicles to the Manage Traffic function so that signal preemption could be provided for the special priority vehicle. The process shall send details of routes for commercial vehicles with hazardous or unusual loads to the Manage Incidents function for monitoring (as a potential, or a planned event). Route guidance data and vehicle guidance route requests and acceptances shall be sent to the data archival process.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'get\_vehicle\_route';
- (b) 'vehicle\_route\_request';
- (c) 'fws-current\_weather\_observations';
- (d) 'fws-weather\_forecasts';
- (e) 'fstws-surface\_trans\_weather\_observations';
- (f) 'fstws-surface\_trans\_weather\_forecasts'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval from local data stores:

- (a) 'route\_segment\_details';
- (b) 'route\_segment\_details\_updated';
- (c) 'routes\_for\_vehicles\_data';
- (d) 'route\_selection\_parameters';
- (e) 'vehicle\_guidance\_route\_accepted'.

Solicited Output Processing: This process shall provide the following output flows as a result of the processing required by receipt of the above inputs:

- (a) 'logged\_special\_vehicle\_route';
- (b) 'special\_vehicle\_priority\_routing';
- (c) 'request\_route\_segment\_data';
- (d) 'routes\_for\_vehicles\_data';
- (e) 'vehicle\_guidance\_route';
- (f) 'vehicle\_route';
- (g) 'route\_guidance\_data\_for\_archive';
- (h) 'vehicle\_route\_request\_for\_archive';
- (i) 'vehicle\_guidance\_route\_accepted\_for\_archive'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) the data received from the Weather Service shall be loaded into a local data store for use during the route determination process;
- (c) the route selection process shall be performed using all the data provided in the request, and take account of the data received from the Weather Service and that in the store of road details;
- (d) the route selection process shall only be performed when a request is received, or when the road details have been updated - see unsolicited input flows above;
- (e) if during the course of the route selection process it is found that data for certain links does not exist in the local store, then the process shall check the store of other road details, and if the data is still not found, set up a request to the Provide Vehicle Route Calculation Data process for that data to be obtained;
- (f) when the route has been selected, the time at which vehicles will use each route segment shall

be entered into the store of routes for vehicles data;

(g) a selected route shall not include segments for which the maximum number of allowed vehicles has been exceeded, as specified in the store of road details - note that this is particularly important for segments that are part of an Automatic Highway System (AHS);

(h) if the number of vehicles on route segments within a selected route fall below preset values in the store of road details, that on completion of the route selection, send details of the links involved and the times at which intersections will be reached to the Manage Traffic function so that a form of traffic control preemption can be produced, for any given vehicle or class of vehicles;

(i) the process shall be responsible for the maintenance of the store of routes for vehicles data, using the appropriate mechanism(s) such as a relational database, for storing the data, and shall delete data relating to vehicles that have now used the segments on their routes from that store;

(j) if the route for a commercial vehicle is constrained by its load, either because of size or its contents, e.g. HAZMAT loads, send a list of the links and arrival times at intersections to the Manage Traffic function (Manage Incidents facility);

(k) the decision on whether a selected route shall contain guidance information shall be based on the source of the request, and the time at which the route is to be used, i.e. those that are not to be used in the immediate future shall not contain guidance data;

(l) unsolicited inputs `vehicle_route_request` and `vehicle_guidance_route_accepted` will each generate an output to be sent to the data archival process;

(m) updates to the `routes_for_vehicles_data` store will generate the `route_guidance_data_for_archive` output to be sent to the data archival process.

### **6.6.2.2 Provide Vehicle Route Calculation Data**

Overview: This process shall fuse link and queue data received from various sources and provide the processed data about links (speed or travel times) and queues to other centers and broadcasted to vehicles (to support autonomous route guidance with dynamic link updates). The input data to be fused shall be obtained from sources within the Manage Traffic function, probe data from vehicles under infrastructure-based route guidance, or with probe data obtained from other sources (such as an electronic toll collection systems). This process shall update the data stores used by another process to calculate vehicle routes. The process shall obtain route segment data upon request or at periodic intervals from other ITS functions. The process shall request data about route segments outside its own geographic area by sending a data request to the process that provides the interface with other ISPs. Link information from other ISPs shall be stored by this process in the link\_data\_store. Usage of current road networks shall be sent to the Manage Maintenance and Construction function and the data archival process.

Unsolicited Input Processing: This process shall receive the following input unsolicited data flows:

- (a) 'current\_highway\_network\_state';
- (b) 'current\_road\_network\_state';
- (c) 'link\_data\_for\_guidance';
- (d) 'planned\_events';
- (e) 'prediction\_data';
- (f) 'request\_route\_segment\_data';
- (g) 'vehicle\_probe\_data\_amalgamation'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval from local data stores:

- (a) 'other\_route\_segment\_data';
- (b) 'route\_segment\_details';
- (c) 'routes\_for\_vehicles\_data';
- (d) 'traffic\_data\_for\_guidance'.

Unsolicited Output Processing: This process shall provide the following output flows regardless of any inputs that are received:

- (a) 'current\_road\_network\_use';
- (b) 'link\_and\_queue\_data';
- (c) 'traffic\_data\_guidance\_request';
- (d) 'current\_road\_network\_use\_for\_archive';
- (e) 'traffic\_probe\_info\_from\_info\_provider';
- (f) 'request\_other\_route\_segment\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'link\_data\_store';
- (b) 'route\_segment\_details';
- (c) 'route\_segment\_details\_updated'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) periodically send the unsolicited output data flows listed above;
- (c) at a rate determined by the implementation broadcast the second unsolicited output data flow to the Provide Vehicle Guidance process, i.e. the frequency will be independent of the number of vehicles;
- (d) when actual road data is received, load it into the appropriate data store for use by other processes within the Select Vehicle Route process;
- (e) each update of the data in a store should be followed by the sending of the road details updated data flow to the process that calculates vehicle routes, to other centers for network information, and to the data archival process;
- (f) if a request for data for route segments outside those in the local area is received, the process shall determine the source of supply of that data using the contents of the store of link data and send a request to the process within the Select Vehicle Route facility that has links to other data suppliers;
- (g) the process shall be responsible for the maintenance of the store of road details both for local

data and that obtained from other data suppliers, plus the store of data showing which links are not local and the identity of the supplier holding the data, using the most appropriate mechanism(s) such as a relational database.

### **6.6.2.3 Provide Route Segment Data for Other Areas**

Overview: This process shall obtain from another ISP current or predicted data for road links that are outside the area served by the local supplier. This area, which may be defined on a geographic or jurisdictional basis, is the portion of the transportation network on which the ISP maintains real time information. Identification of which ISP to contact is based upon a store that maps a link to the ISP which maintains real time information about this link. If there is no map to another ISP in the data store, then the process will return default or static data for the link(s). This process shall also respond to similar requests from other ISPs for real time data on links within the local database.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'foisp-request\_data';
- (b) 'request\_other\_data'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to a terminator and requests for data retrieval:

- (a) 'foisp-data\_supply';
- (b) 'link\_data\_store';
- (c) 'road\_details'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'other\_route\_segement\_data';
- (b) 'toisp-data\_supply';
- (c) 'toisp-request\_data'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) use the most appropriate communications protocols to handle the data traffic on the link to the terminator, bearing in mind the transmission medium plus the size and frequency of the data flow.

#### **6.6.2.4 Update Vehicle Route Selection Map Data**

Overview: This process shall provide the interface to map update providers, or other appropriate data sources, through which updates of the digitized map data can be obtained. The process shall request new data from the provider on request from the ISP operator interface process. The data received from the supplier shall be loaded into a the map\_data\_for\_route\_selection data store by the process in such a way that it can be easily used by the route selection process in determining vehicle routes, trip planning, and on-line vehicle guidance.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'request\_route\_selection\_map\_update'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to the map provider terminator:  
(a) 'fmup-route\_selection\_map\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'map\_data\_for\_route\_selection';  
(b) 'tmup-request\_route\_selection\_map\_update'.

Functional Requirements: This process shall:  
(a) continuously monitor for receipt of the unsolicited input data flow listed above;  
(b) when the input is received, generate the second output data flow identified above;  
(c) when the new data is received from the map update provider terminator, update the data store using the first output data flow identified above;  
(d) be responsible for the management of the data in the store of map data, using the appropriate mechanism(s) such as a relational database, for storing the data.



### **6.6.2.5 Provide ISP Operator Route Parameters Interface**

Overview: This process shall provide the interface through which the ISP operator can input and update route calculation parameters used by the Provide Driver and Traveler Services function. The process shall provide an interface through which the ISP operator can review and request update of map data. The operator shall be able to use the process to request digitized map updates from suppliers, request output of trip planning and route selection control parameters, or to update the control parameters in the route\_selection\_parameters data store. The process shall support inputs from the ISP operator in manual or audio form, and shall provide its outputs in audible or visual forms. It shall enable the visual output to be in hardcopy, and/or display.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'fispo-request\_other\_routes\_selection\_map\_data\_update';
- (b) 'fispo-request\_route\_selection\_map\_data\_update';
- (c) 'fispo-route\_selection\_parameters\_request';
- (d) 'fispo-route\_selection\_parameters\_update'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval from local data stores:

- (a) 'route\_selection\_parameters'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'request\_route\_selection\_map\_update';
- (b) 'request\_other\_routes\_map\_update';
- (c) 'tispo\_route\_selection\_parameters'.

Functional Requirements: This process shall meet:

- (a) continuously monitor for receipt of the unsolicited input data flows listed above;
- (b) when either of the first two inputs are received, generate the appropriate of the first two output data flows identified above;
- (c) when the third input is received, read the data from the route selection parameters data store and output it in the third output data flow shown above;
- (d) when the fourth input is received, load the data into the store of route selection parameters;
- (e) be responsible for the management of the data in the store of route selection parameters, using the appropriate mechanism(s) such as a relational database, for storing the data.

### **6.6.2.6 Calculate Vehicle Probe Data for Guidance**

Overview: This process shall calculate route segment travel times from vehicle probe data. The probe data shall be accepted by the process from a variety of sources including toll collection points and vehicles receiving on-line infrastructure based guidance. The process shall be responsible for combining the data obtained from these sources and producing one set of route segment travel times or route segment speeds. The process shall indicate route segments for which no data, or insufficient data, is available (this indication could be by setting the link time or speed to zero). Vehicle guidance probe data shall be sent to the data archival process.

Unsolicited Input Processing: This process shall receive the following input unsolicited data flows:

- (a) 'vehicle\_guidance\_probe\_data';
- (b) 'vehicle\_toll\_probe\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'vehicle\_probe\_data\_amalgamation';
- (b) 'vehicle\_guidance\_probe\_data\_for\_archive'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input data flows listed above;
- (b) when either of the input data flows is received, recalculate the route segment travel time for which the data applies, using an appropriate smoothing factor to remove any sudden fluctuations;
- (c) periodically send the amalgamated route segment travel times calculated in (b) to the process that provides vehicle route calculation data;
- (d) when new vehicle guidance probe data is received, the output data will in turn be sent to the data archival process.

### **6.6.3 Update Other Routes Selection Map Data**

Overview: This process shall provide the interface to a map update providers through which to obtain fresh updates of digitized map data used in identification of non-motorized portions of routes. The process shall request new data from the provider on request from the ISP operator interface process. The data received from the supplier shall be loaded into the map\_data\_for\_general\_use data store by the process in such a way that it can be easily used by the route selection process in determining non-vehicle routes for use in on-line traveler guidance and trip planning.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'request\_other\_routes\_map\_update'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to external functions:

- (a) 'fmup-other\_routes\_map\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'tmup-request\_other\_routes\_map\_update';
- (b) 'map\_data\_for\_general\_use'.

Functional Requirements: This process shall:

- (a) continuously monitor for the receipt of the unsolicited data flow shown above;
- (b) when the data flow in (a) is received, generate the first solicited output data flow shown above and continuously monitor for receipt of the solicited input data flow shown above;
- (c) when the flow in (b) is received, output the second solicited output data flow shown above;
- (d) be capable of receiving the input data in a variety of formats and converting it into a single format suitable for use with the store of digitized map data;
- (e) be responsible for the management of the data in the store of the pollution data log, using the appropriate mechanism(s) such as a relational database, for storing the data.

#### **6.6.4 Select Transit Route**

Overview: This process shall determine routes that are based on regular transit services. Routes shall be provided by the process to travelers in response to trip planning and on-line personal guidance requests. The data provided by the process shall be different for the two types of requests since trip planning information will not need the detail that guidance data requires. The process shall base routes on the current state of the regular transit services using data obtained from processes in the Manage Transit function. It shall also respond to any preferences and constraints, such as those for travelers with special needs, that are specified in the route request. Data on the current use of transit routes in on-line guidance shall be provided by the process to the Manage Demand function to aid in demand management. This data on current use of the transit routes in on-line guidance is stored in the transit\_mode\_routes data store.

Data Flows: The input data flow requesting a route is unsolicited. All other input flows and all output flows are solicited with the exception of the following which contains data requested from and written to data stores:

- (a) 'transit\_mode\_routes';
- (b) 'transit\_route\_details'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flow requesting a transit route shown in the list of input data flows above;
- (b) when the input in (a) is received, select a route that meets the requirements of the data in the constraints and preferences supplied as part of the request, using the data in the store of transit route details;
- (c) as a result of (b) send the route details back to the requesting process in the transit route output data flow identified above and load the route details into the store of transit mode routes;
- (d) periodically obtain new transit services data from the manage Transit function and load it into the store of transit route details;
- (e) when the estimated arrival time of the last segment of each route expires, delete the entire route from the store of transit mode route details;
- (f) periodically send a copy of the store of transit mode route details to the Manage Demand facility of the Manage Traffic function in the current transit routes use data flow;
- (g) be responsible for the management of the data in the stores of transit route details and transit mode route details, using the appropriate mechanism(s) such as a relational database, for storing the data.

### 6.6.5 Select Other Routes

Overview: This process shall determine routes, or portions of routes, not based on use of vehicles or regular transit services. Routes shall be provided by the process for travelers in response to trip planning, on-line personal guidance requests, and for data archival. Data provided by the process will be different for the two types of requests since the data for trip planning will not need the level of detail that guidance data requires. The process shall calculate its routes using digitized map data obtained and updated by another process. It shall make use of the alternative modes, (such as ferries, walking, cycling, etc.) that have been specified in the route request, and shall also take account of any preferences and constraints, (such as those for travelers with special needs). Data on current use of routes in on-line guidance shall be provided by the process to the Manage Demand function.

Data Flows: The input data flow requesting a route is unsolicited. All other input flows and all output flows are solicited with the exception of the following which contains data requested from and written to data stores:

- (a) 'other\_modes\_routes', read and write;
- (b) 'map\_data\_for\_general\_use', read only.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flow requesting an other modes route, shown in the list of input data flows above;
- (b) when the input in (a) is received, select a route that meets the requirements specified in the constraints and preferences supplied as part of the request, using the data in store of map data;
- (c) as a result of (b) send the route details back to the requesting process in the other route output data flow identified above and load the route details into the store of other mode routes;
- (d) when the estimated arrival time of the last segment of each route expires, delete the entire route from the store of other mode route details;
- (e) periodically send a copy of the store of other mode route details to the Manage Demand facility of the Manage Traffic function in the current other routes use data flow;
- (f) use the appropriate mechanism(s) such as a relational database, to retrieve data from the store of digitized map data identified above;
- (g) be responsible for the management of the data in the store of other mode route details, using the appropriate mechanism(s) such as a relational database, for storing the data;
- (h) send the other routes currently used to the data archival process.

### **6.7.1.1 Build Driver Personal Security Message**

Overview: This process shall respond to the input of a request from a driver for action by the emergency services. Input of the request shall be received by the process from the driver via a panic button or some other functionally similar form of input device provided as part of the in-vehicle equipment. When the input is received, the process shall send a message to the communications process, containing the vehicle's current location, its identity and basic vehicle data relevant to its current condition, as well as any other data, such as personal medical history, vehicle orientation, etc., that may be developed in-vehicle by other systems.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'fd-emergency\_request';
- (b) 'vehicle\_location\_for\_emergencies';
- (c) 'vehicle\_status\_details\_for\_driver\_security'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval:

- (a) 'vehicle\_identity\_for\_driver\_security\_store'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'driver\_personal\_emergency\_request';
- (b) 'vehicle\_identity\_for\_driver\_security\_store'.

Functional Requirements: This process shall:

- (a) continuously monitor arrival of input data flow from the driver;
- (b) when input from the driver is received obtain the current vehicle location and status and send this in a message with the vehicle identity and status to the communications process;
- (c) if some or all of the data in (b) is missing, e.g. there is no current location, the message must be sent anyway, and repeated when a location becomes available.

### **6.7.1.2 Provide Driver In-vehicle Communications Function**

Overview: This process shall prepare and send an emergency message from a driver to the Manage Emergency Services function. The message shall only be sent by the process in response to data received from another process that monitors driver inputs. Once an emergency message has been sent, the process shall send a message to that effect to another process in the Provide Vehicle Monitoring and Control function for output to the driver. The process shall then await a response from the Manage Emergency Services function, and then send a detailed message to the other process for output to the driver. Output of the emergency message to the Manage Emergency Services function shall be repeated by the process at regular intervals until a response is received.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'driver\_personal\_emergency\_request'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval:  
(a) 'emergency\_request\_driver\_acknowledge'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'emergency\_request\_driver\_details';
- (b) 'emergency\_message\_driver\_output';
- (c) 'driver\_status\_update'.

Functional Requirements: This process shall:

- (a) transmission of the output message must be as near to instantaneous as possible following the receipt of data from the driver security message preparation process;
- (b) the current data and time must be added to the data received from the driver security message preparation process;
- (c) when the acknowledgment message is received it should be sent immediately to the interface process for driver advisory data;
- (d) transmission of the output message must be repeated until an acknowledgment message is received updating the date and time as they change;
- (e) initially, the message sent for output to the driver must show that data has been sent, and only be changed when an acknowledgment is received.

### **6.7.2.1. Determine In-Vehicle Guidance Method**

Overview: This process shall act as the interface for guidance requests received from drivers in vehicles. The process shall select the best method for in-vehicle guidance based on data in the driver's request. Three general methods of route guidance are supported: 1) dynamic (infrastructure based guidance is provided to the vehicle unit), 2) dynamic autonomous (link and queue speed or travel times are obtained from the infrastructure and used by the autonomous in vehicle unit), and autonomous (the in vehicle unit uses only locally available data- there is no information provided by the infrastructure). When dynamic guidance is selected, the vehicle's travel time for each link shall be provided by the process back to a central source of data. If the communications link to the central source fails in either of the modes that use it, the process shall automatically revert to the use of local data only. When the original mode was centralized guidance, the process shall use the last set of guidance data that was received, and if this is not sufficient for the vehicle to reach the requested destination, automatically revert to autonomous guidance using local data only.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'driver\_guidance\_request'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval from local data stores:

- (a) 'autonomous\_vehicle\_guidance\_data';
- (b) 'driver\_guidance\_accepted';
- (c) 'driver\_guidance\_data';
- (d) 'dynamic\_vehicle\_guidance\_data';
- (e) 'retained\_vehicle\_guidance\_data'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'autonomous\_vehicle\_guidance\_accepted';
- (b) 'autonomous\_vehicle\_guidance\_data\_request';
- (c) 'driving\_guidance\_instructions';
- (d) 'driver\_input\_request';
- (e) 'dynamic\_vehicle\_guidance\_data\_request';
- (f) 'retained\_vehicle\_guidance\_data'
- (g) 'vehicle\_guidance\_route\_accepted'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flow listed above;
- (b) select the appropriate process for the guidance data request dependent on whether the data input by the driver specifies the use of dynamic guidance;
- (c) if dynamic guidance is not available and was requested, then the autonomous guidance process must be used;
- (d) if dynamic guidance is used but becomes unavailable then the autonomous guidance process must be used from the point at which the dynamic guidance was lost;
- (e) if dynamic guidance having been lost is regained, the first dynamic guidance request must use the vehicle's current location as the origin for the route request;
- (f) the process shall be responsible for the maintenance of the store of data used in guidance requests using the appropriate mechanism(s) such as a relational database, for storing the data.

### **6.7.2.1. Provide Dynamic In-Vehicle Guidance**

Overview: This process shall enable dynamic vehicle route guidance data to be calculated. The process shall perform the same dynamic vehicle route guidance services for vehicles that are under automatic control using automatic highway system (AHS) lanes. When providing dynamic guidance, the process provides vehicle travel times as probe data to another process in the Provide Driver and Traveler Services function. The process shall base its guidance request on data input by the driver through another process, and on the vehicles current location as provided by another process.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'ahs\_route\_request';
- (b) 'dynamic\_vehicle\_guidance\_data\_request';
- (c) 'vehicle\_location\_for\_dynamic\_guidance'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes:

- (a) 'vehicle\_guidance\_route'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'ahs\_route';
- (b) 'dynamic\_vehicle\_guidance\_data';
- (c) 'vehicle\_guidance\_probe\_data';
- (d) 'vehicle\_route\_request'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the second input in (a) is received send the driver route request data flow;
- (c) if no origin is specified in the guidance data request, then the current vehicle location data obtained from the unsolicited input flow shall be used as the origin of the flow in (b);
- (d) when the solicited input flow is received, load the data into the flow of dynamic driver guidance data and sent it to the process that determines the driver guidance method;
- (e) every time a route request is made compute the time since the last request and send it with the vehicle's current position in the flow of vehicle probe data;
- (f) when the first unsolicited input flow is received, send a request for a route based on using automatic highway system (AHS) lanes instead of the request in (b);
- (g) the route data resulting from (f) should be sent to the process requesting the AHS route and no guidance data shall be output as in (d) above.



### **6.7.2.2 Process Vehicle Location Data**

Overview: This process shall provide the vehicle's current location. It shall calculate the location from one or more sources of position data such as GPS, DGPS, odometer and differential odometers, and shall refine its calculations using techniques such as map matching, etc. Location data (intended for use by in-vehicle navigation, tracking systems, guidance systems, and emergency notification systems) should be provided by the process in a manner that is as precise as is practical within cost and technology constraints. Location data intended for transit vehicles and driver advisories may be less precise.

Data Flows: The input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) continuously compute the vehicle's most probable current location using the data in the input flows, refinement and/or filtering algorithms (e.g. dead reckoning, map-following, etc).
- (c) provide the vehicle location to other processes in the Provide Driver and Traveler Services, Manage Commercial Vehicle, Manage Transit, Manage Maintenance and Construction, and Manage Emergency Services functions using output flows as identified above;
- (d) it shall be possible for the process to compute the location from as many sources of data as are simultaneously available to it, and to apply filtering and/or map matching algorithms as may be appropriate to consolidate or to choose among locations calculated from the various sources of data;
- (e) vehicle location determination for transit and driver advisories may be of lesser precision than locations intended for navigation and route guidance processes.

### **6.7.2.3 Provide Driver Guidance Interface**

Overview: This process shall provide a user interface for the vehicle's driver through which route guidance is provided. Three types of route guidance provided by other processes shall be supported by this process (dynamic infrastructure based, autonomous with infrastructure data update, and autonomous). The process shall enable input by the driver of the type of guidance required, the data from which the route is to be determined and output of the resulting route. The process shall not provide on-line guidance until the route has been accepted by the driver. For those forms of guidance that require an on-board map database, the process shall provide an interface through which the driver may obtain and pay for an initial copy of the database plus updates when needed. The process shall support inputs from the driver in either manual or audio form, and shall provide its outputs in audible or visual forms. It shall enable the visual output to be either in hardcopy, and/or display. Both types of output shall not impair the driver's ability to control the vehicle in a safe manner.

Data Flows: All input data flows are unsolicited and all output flows are solicited

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flows from the driver listed above;
- (b) when any inputs are received, generate the appropriate outputs identified above;
- (c) implementation of guidance will generate a succession of output data which must be passed on to the driver without the need for further input;
- (d) the output in (c) must be retained until the next set of guidance data arrives for output;
- (e) the advanced payment for map data flow is only generated when the driver credit identity data flow contains a stored credit value and not a credit identity;
- (f) all input and output flows must be encrypted in such a way that it is not possible to determine the credit identity or stored credit being transmitted using any form of digital or analogue technique.

#### **6.7.2.4 Update Vehicle Navigable Map Database**

Overview: This process shall update the vehicle's navigable database based on digitized data obtained from a map provider, or other appropriate data source. The update shall be initiated by the driver through another process. The process shall have the capability to allow a financial transaction (to pay for the update) to be successfully completed using processes in the Provide Electronic Payment Services function. When the new map data is received, it shall be loaded by the process into the vehicle\_map\_database data store for use by other processes. The result of the update request (successful or not) shall be sent back to the driver interface process for output to the driver.

Data Flows: The driver update request input data flow is unsolicited. All other input flows and the output flows are solicited with the exception of the following which contains the new navigable map data to be written to its data store: 'vehicle\_map\_database'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the driver update request input flow listed above;
- (b) when the input in (a) is received, send the data flow to the map update provider requesting the cost of the update;
- (c) when a response to (b) is received and the credit identity not the stored credit was provided as part of the data in (a), generate the payment request;
- (d) when a successful response is received to (c), generate the request to the map supplier for a new navigable map database;
- (e) when a response to (b) is received and the stored credit not the credit identity was provided as part of the data in (a), compare it with the stored credit value and if greater send the update response data flow to the driver interface process showing an unsuccessful update;
- (f) if the check in (e) shows that there is sufficient stored credit, generate the request to the map supplier for a new navigable map database;
- (g) when the response to the map database requests in (d) or (f) is received, load the new navigable map data into the data store, and send the update response data flow to the driver interface process showing a successful update;
- (h) if the map update process fails, send the update response data flow to the driver interface process showing an unsuccessful update;
- (i) use the appropriate mechanism(s) such as a relational database, to write data to the store identified above;
- (j) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **6.8.1.1. Determine Personal Portable Device Guidance Method**

Overview: This process shall act as the interface for personal guidance requests received from travelers with personal portable devices. The process shall select the best method for personal guidance based on data in the traveler's request. Two methods shall be available to the process, comprising dynamic infrastructure based guidance is provided to the personal portable device), and autonomous (the personal portable device uses only locally available data- there is no information provided by the infrastructure). If the communications link to the central source fails, the process shall use the last set of guidance data that was received, and if this is not sufficient for the traveler to reach the requested destination, automatically revert to the use of autonomous guidance using local data only.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'traveler\_guidance\_request'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval from local data stores:  
(a) 'autonomous\_traveler\_guidance\_data';  
(b) 'dynamic\_traveler\_guidance\_data';  
(c) 'retained\_traveler\_guidance\_data';  
(d) 'traveler\_guidance\_accepted';.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'autonomous\_traveler\_guidance\_accepted';  
(b) 'autonomous\_traveler\_guidance\_data\_request';  
(c) 'dynamic\_traveler\_guidance\_data\_request';  
(d) 'retained\_traveler\_guidance\_data';  
(e) 'traveler\_input\_request';  
(f) 'traveler\_guidance\_instructions';  
(g) 'traveler\_route\_accepted'.

Functional Requirements: This process shall:  
(a) continuously monitor for receipt of the unsolicited input flow listed above;  
(b) select the appropriate process for the guidance data request dependent on whether the data input by the traveler specifies the use of dynamic guidance;  
(c) if dynamic guidance is not available and was requested, then the autonomous guidance process must be used;  
(d) if dynamic guidance is used but becomes unavailable then the autonomous guidance process must be used from the point at which the dynamic guidance was lost;  
(e) if dynamic guidance having been lost is regained, the first dynamic guidance request must use the traveler's current location as the origin for the route request;  
(f) the process shall be responsible for the maintenance of the store of data used in guidance requests using the appropriate mechanism(s) such as a relational database, for storing the data.

### **6.8.1.1. Provide Personal Portable Device Dynamic Guidance**

Overview: This process shall enable dynamic traveler guidance data to be calculated. The process shall base its guidance request on the data input by the traveler from a personal portable device through other processes, and on the traveler's current location as provided by another process.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'dynamic\_traveler\_guidance\_data\_request';
- (b) 'traveler\_location\_for\_dynamic\_guidance'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes:

- (a) 'traveler\_guidance\_route'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'dynamic\_traveler\_guidance\_data';
- (b) 'traveler\_route\_request'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input data flow listed above;
- (b) when the first input data flow in (a) is received send the traveler route request data flow;
- (c) if no origin is specified in the guidance data request, then the current traveler location data obtained from the unsolicited input flow shall be used as the origin of the flow in (b);
- (d) when the solicited input flow is received, load the data into the flow of dynamic traveler guidance data and sent it to the process that determines the traveler guidance method.

### **6.8.1.2 Provide Personal Portable Device Guidance Interface**

Overview: This process shall be responsible for providing a user interface for the traveler through which personalized route guidance can be delivered. The process shall enable the traveler to input data to request a suitable route. This process shall be capable of supporting two types of route guidance: dynamic (infrastructure based guidance is provided to the personal portable device), and autonomous (the personal portable device uses only locally available data- there is no information provided by the infrastructure). The process shall also act as the interface for output of on-line guidance to the traveler. Multimodal routes shall be supported by the process. The process shall not provide on-line guidance until the route has been accepted by the traveler. For those forms of guidance that require an on-board map database, the process shall provide an interface through which the traveler may obtain and pay for an initial copy of the database plus updates when needed. The process shall support inputs from the traveler in either manual or audio form, and shall provide outputs in audible or visual forms. It shall enable the visual output to be either in hardcopy, or display. Both types of output shall be produced in such a way that in using them the traveler does not become a hazard to other travelers.

Data Flows: All input data flows are unsolicited with the exception of traveler\_guidance\_instructions and traveler\_map\_update\_response which are solicited. All output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows from the traveler listed above;
- (b) when any inputs are received, generate the appropriate outputs identified above;
- (c) implementation of guidance will generate a succession of output data which must be passed on to the traveler without the need for further input;
- (d) the output in (c) must be retained until the next set of guidance data arrives for output;
- (e) the advanced payment for map data flow is only generated when the traveler credit identity data that is part of the traveler\_personal\_data flow contains a stored credit value and not just a credit identity;
- (f) all input and output flows must be encrypted in such a way that it is not possible to determine the credit identity or stored credit being transmitted using any form of digital or analogue technique.

### **6.8.1.3 Process Personal Portable Device Location Data**

Overview: This process shall provide the traveler's current location. It shall calculate the location from one or more sources of position data such as GPS or DGPS, and shall refine its calculations using techniques such as map matching, dead reckoning, etc. The process shall provide the location to the other processes for use in autonomous and dynamic guidance. This location should be precise as is practical within cost and technology constraints. It is intended for use by traveler personal navigation and guidance systems, as well as emergency notification systems.

Data Flows: The input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) continuously compute the vehicle's current location using the data in the input flows and send it to other processes in the Provide Driver and Traveler Services and Manage Emergency Services functions using the output flows identified above;
- (c) it shall be possible for the process to compute the location from as many sources of data as are simultaneously available to it, using the following priority order where more than one is available: differential GPS, GPS, map matching, magnetic flux and dead reckoning;
- (d) the location determined by the source with the highest priority shall be used at all times, except that sources determined to be unreliable may be temporarily bypassed (e.g. GPS signals with low signal quality).

#### **6.8.1.4 Update Traveler Navigable Map Database**

Overview: This process shall update the traveler's navigable database based on digitized data obtained from a map provider, or other appropriate data source. The update shall be initiated by the traveler through another process. The process shall have the capability to allow a financial transaction (to pay for the update) to be completed using processes in the Provide Electronic Payment Services function. When the new map data is received, it shall be loaded by the process into the traveler\_map\_database data store for use by other processes. The result of the update request (successful or not) shall be sent back to the traveler interface process for output to the traveler.

Data Flows: The traveler update request input data flow is unsolicited. All other input flows and the output flows are solicited with the exception of the following which contains the new navigable map data to be written to its data store: 'traveler\_map\_database'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the traveler update request input flow listed above;
- (b) when the input in (a) is received, send the data flow to the map update provider requesting the cost of the update;
- (c) when a response to (b) is received and the credit identity not the stored credit was provided as part of the data in (a), generate the payment request;
- (d) when a successful response is received to (c), generate the request to the map supplier for a new navigable map database;
- (e) when a response to (b) is received and the stored credit not the credit identity was provided as part of the data in (a), compare it with the stored credit value and if greater send the update response data flow to the traveler interface process showing an unsuccessful update;
- (f) if the check in (e) shows that there is sufficient stored credit, generate the request to the map supplier for a new navigable map database;
- (g) when the response to the map database requests in (d) or (f) is received, load the new navigable map data into the data store, and send the update response data flow to the traveler interface process showing a successful update;
- (h) if the map update process fails, send the update response data flow to the traveler interface process showing an unsuccessful update;
- (i) use the appropriate mechanism(s) such as a relational database, to write data to the store identified above;
- (j) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

#### **6.8.1.5 Provide Traveler Emergency Message Interface**

Overview: This process shall provide an emergency notification interface for a traveler using a personal portable device. The emergency notification interface shall enable the output of messages generated by a traveler's emergency request to another process.

Data Flows: All input data flows with the exception of that for traveler personal information and traveler location are unsolicited, but all output flows are solicited.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the input in (a) is received, generate the traveler emergency message output flow identified above.

### **6.8.2.1 Build Traveler Personal Security Message**

Overview: This process shall respond to the input of a request from a traveler for action by the emergency services. Input of the request shall be received by the process from the traveler via a panic button or some other functionally similar form of input device provided as part of the traveler's personal portable device. When the input is received, the process shall send a message to the communications process, containing the traveler's current location and identity.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:

- (a) 'ft-emergency\_request';
- (b) 'traveler\_location\_for\_emergencies'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval:

- (a) 'traveler\_identity\_store'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:

- (a) 'traveler\_personal\_emergency\_request'.

Functional Requirements: This process shall:

- (a) continuously monitor arrival of input from the traveler;
- (b) when input from the traveler is received obtain the current location and traveler identity and send this in a message to the communications process;
- (c) if some or all of the data in (b) is missing, e.g. there is no current location, the message must be sent anyway, and repeated when a location becomes available.

### **6.8.2.2 Provide Traveler Emergency Communications Function**

Overview: This process shall prepare and send an emergency message from a traveler's personal portable device to the Manage Emergency Services function. The message shall only be sent by the process in response to data received from another process that monitors traveler inputs. Once an emergency message has been sent, the process shall send a message to that effect to another process for output to the traveler. The process shall then await a response from the Manage Emergency Services function, and when received again send a message to the other process for output to the traveler. Output of the emergency message to the Manage Emergency Services function shall be repeated by the process at regular intervals until a response is received.

Unsolicited Input Processing: This process shall receive the following unsolicited input data flows:  
(a) 'traveler\_personal\_emergency\_request'.

Solicited Input Processing: This process shall receive the following data flows as a result of output being sent to other processes and requests for data retrieval:  
(a) 'emergency\_request\_personal\_traveler\_acknowledge'.

Solicited Output Processing: This process shall provide the following output flows as a result of the above inputs being received:  
(a) 'emergency\_request\_personal\_traveler\_details';  
(b) 'emergency\_message\_traveler\_output'.

Functional Requirements: This process shall:  
(a) transmission of the output message must be as near to instantaneous as possible following the receipt of data from the security message process;  
(b) the current data and time must be added to the data received from the security message process;  
(c) when the acknowledgment message is received it should be sent immediately to the interface process for the personal traveler guidance facility;  
(d) transmission of the output message must be repeated until an acknowledgment message is received updating the date and time as they change;  
(e) initially, the message sent to the traveler must show that data has been sent, and only changed when an acknowledgment is received.

### **6.8.3.1 Get Traveler Personal Request**

Overview: This process shall receive traveler requests from a personal device (portable, or non portable) then provide support for trip planning, traffic, transit and other (yellow pages and event) services information, trip confirmation, yellow pages services confirmation, and payment requests. The process shall send these requests to the appropriate processes within the Provide Driver and Traveler Services function for further processing to generate responses. The interface to the traveler shall be provided through a separate process, from which input to this process originates.

Data Flows: The input data flow is unsolicited and all output flows are solicited.

Functional Requirements: This process shall:  
(a) continuously monitor for receipt of the traveler trip planning input flow listed above;  
(b) when the flow in (a) is received, extract the data and send it to the appropriate processes in the Provide Driver and Traveler Services function;  
(c) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.



### **6.8.3.2 Provide Traveler with Personal Travel Information**

Overview: This process shall provide the traveler (using a personal device) with data about all requested trip, traffic, transit, other (yellow pages or event) services information, confirmation of any requested reservations, and payments made as part of confirmed trip plans. The data shall be sent by the process to an interface process which is responsible for its actual output to the traveler. This data shall include digitized map data to act as the background to the output when the data is shown in a suitable format. This process shall request data from other ITS functions or be sent the data as a result of requests from another process.

Data Flows: All output flows are solicited and all input data flows are unsolicited with the exception of the following:

- (a) 'traffic\_data\_for\_broadcast\_to\_personal\_devices' - which is received as a result of output being sent to another process;
- (b) 'transit\_deviations\_for\_broadcast\_to\_personal\_devices' - which is received as a result of output being sent to another process;
- (c) 'map\_data\_for\_traveler\_personal\_displays' - which contains data requested from a data store.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flows listed above that are not details of transit services, traffic data and the display map data;
- (b) when any of the flows in (a) are received, retrieve the relevant digitized display map data from the local store and send the combined data to the traveler interface process;
- (c) when the flow received in (a) contains a request for transit or traffic data, send the request to the relevant process in the Manage Transit or Manage Traffic function;
- (d) the input data received as a result of (c) shall be combined with the relevant digitized display map data from the local store and sent to the traveler interface process;
- (e) use the most appropriate mechanism(s) such as a relational database, to retrieve data from the store identified above;
- (f) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **6.8.3.3 Provide Traveler Personal Interface**

Overview: This process shall provide an interface in a personal device through which travelers can plan and confirm trips, as well as obtain current traffic and transit information. The process shall support trip planning and confirmation of other (yellow pages or non-motorized) services such as lodging, restaurants, theaters, bicycle facilities and other tourist activities. The process shall be able to load in the traveler\_personal\_regular\_data store frequently used information such as traveler identity (the owner of the personal device), home and work locations, etc. This will reduce the amount of input needed by the traveler for each trip request.

The process shall also carry out input data verification and require input confirmation, with the traveler, before passing the data to other processes. The traveler's payment information and location (when traveler is using a portable device) shall be obtained by this process from other processes. The process shall support inputs from the traveler in both digital and audio form, and shall provide its outputs in audible and visual forms that are consistent with a personal device. This process shall include forms suitable for travelers with hearing and vision physical disabilities. The process shall display data for as long as required by the traveler and must enable viewing of previously output data. When used with a portable device, the process shall provide the traveler the option to filter the data (to be displayed) relevant to the travelers current location.

Data Flows: All input data flows are unsolicited and all output flows are solicited, with the exception of the 'traveler\_personal\_regular\_data' data flow which contains data requested from or written to a data store.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flows from the traveler listed above;
- (b) when any of the inputs in (a) are received, check for content, accuracy, consistency and out of range values, utilizing data from the local store identified above if necessary;
- (c) generate the output identified above and load the requested data into the local data store;
- (d) continually monitor the data in the local store and compare it with that being input by travelers, deleting any data from the store which is not frequently used;
- (e) be responsible for the management of the data in the store of regularly used data, using the appropriate mechanism(s) such as a relational database, for storing the data;
- (f) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **7.1.1.1 Read Tag Data for Tolls**

Overview: This process shall be responsible for requesting the data from the toll tag being carried on-board the vehicle and used as a traveler card / payment instrument. If there is no tag or the data it contains cannot be properly read, this process shall provide a message for the vehicle operator to contact the toll authority (or toll system operator). The process shall send a request to other processes to obtain an image of the vehicle. If the vehicle is exiting a closed toll system the data shall be checked by this process to see if it contains an entry point toll segment number. If not present, the process would be referred to another process for off-line resolution. If the toll segment identity is present, it shall be combined with the vehicle characteristics, e.g., size, type, etc., to form the data upon which the toll payment transaction can be based, and the data sent to another process. If the vehicle is entering a closed toll system, the entry point toll segment shall be written onto the tag so that it can be used as the mechanism for charging for the use of the toll road.

Data flows: All input and output data flows are solicited with the exception of the following item which is used to trigger the process:

- (a) 'vehicle\_toll\_characteristic\_data' - which is received from another process that detects a vehicle's presence.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the unsolicited input identified above is received, generate the outputs identified above;
- (c) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

#### **7.1.1.10 Determine Advanced Toll Bill**

Overview: This process shall be responsible for receiving a request to pay an advanced toll. It shall obtain the price of the toll segment(s) for which advanced payment is being requested from a local data store and shall then forward it to the billing processes. The store of toll prices shall be maintained by another process.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, generate the outputs identified above;
- (c) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques;
- (d) use the most appropriate mechanism(s) such as RDBMS, to retrieve data from the store identified above.

#### **7.1.1.11 Manage Toll Archive Data**

Overview: This process shall obtain toll operational data and toll pricing data and distribute it to the Manage Archived Data function. As data is received into this process quality control metrics shall be assigned. The appropriate meta-data shall be generated and stored along with the data. A catalog of the data shall be maintained to allow requesters to know what data is available from the archive store. The process shall run when a request for data is received from an external source, or when fresh data is received. This process also accepts the status of the transmitted data from the Manage Archived Data function. The Toll Administrator interacts with this process to manage the collection and transfer of data.

All inputs to this process are unsolicited, and all outputs are solicited, except that the 'toll\_archive\_status' is a solicited input.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when any of the unsolicited data inputs shown above is received, the process shall store them in the data store along with meta data (data attributes about the data), and update the catalog;
- (c) when the unsolicited input from the toll administrator is received, the process shall update the data store accordingly;
- (d) when the request for toll archive data is received, the process shall immediately generate the solicited output shown above from the data store;
- (e) the process should then receive the toll archive status solicited input and send this status to the toll administrator;
- (f) data shall only be sent to the source from which the data request originated;
- (g) before output, the process shall put the data into a format that is easily read and interpreted by external processes and can also be read by travelers and toll users with the minimum of further processing.

### **7.1.1.2 Calculate Vehicle Toll**

Overview: This process shall be responsible for calculating the toll for the detected vehicle based on the vehicle's characteristics and data obtained from the tag being carried by the vehicle. This process shall calculate the cost of the toll using segment(s) traveled by the vehicle. Segment information is obtained by reading data that contains standard prices for toll segments plus any variations to pricing received from the toll operator.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, generate the outputs identified above;
- (c) use the most appropriate mechanism(s) such as a relational database, to retrieve data from the store identified above;
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **7.1.1.3 Manage Bad Toll Payment Data**

Overview: This process shall be responsible for maintaining a data store containing a list of invalid driver credit identities. This process shall use this data to verify credit identities and commercial vehicle carrier numbers provided for checking by the billing process. Verification shall ensure that the current toll payment transaction is using a credit identity or carrier identity that has not previously had an invalid transaction. Details of potential invalid credit identities or carrier numbers shall be sent by this process to the financial institution for verification. This process shall also receive from the financial institution details of invalid traveler card / payment instrument data that has been found by other means.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following which contains data written to or requested from a data store:

- (a) 'bad\_toll\_payment\_list'.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, generate the outputs identified above;
- (c) be responsible for the management of the data in the store of bad driver bad\_toll\_payment\_list data, using the appropriate mechanism(s) such as a relational database, for storing the data.
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

#### **7.1.1.4 Check for Advanced Tolls Payment**

Overview: This process shall be responsible for checking to see if the required toll payment has already been made. The process shall determine the existence of an advanced payment for the toll segment(s) by comparing the received payment information with that in the store containing the list of advanced payments. If the payment has already been made then the process shall remove the requirement for local billing and remove the record of the advanced payment from the store. Details of each payment transaction shall be sent by the process to another process with the payment information received from the driver removed.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following which contains data requested from a data store:

(a) 'advanced\_toll\_payment\_list'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, generate the outputs identified above;
- (c) be responsible for the management of the data in the store of advanced tolls payment data, using the most appropriate mechanism(s) such as RDBMS, for storing the data;
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques;
- (e) remove the payment information received from the driver from all data that is sent to another process for loading into the store of toll payment transactions.

### **7.1.1.5 Bill Driver for Tolls**

Overview: This process shall be responsible for obtaining payment for the current or advanced toll. The process shall achieve this either by requesting that the toll cost be deducted from the credit being stored by the toll tag that is acting as the traveler card / payment instrument, or by informing the driver that payment for the toll will be debited to the credit identity provided by the tag. Before sending data to the tag, the process shall check that either the credit identity is not already in the list of bad payers, or the stored credit is not less than the toll cost. If either of these conditions is true, the process shall obtain an image of the driver and vehicle which can be forwarded to the appropriate enforcement agency via another process. When the appropriate payment transaction has been completed, the toll entry segment identity shall be cleared from the tag so that it can be used the next time that the vehicle is on a toll road. The tag may be in the form of some type of credit or debit card, or an electronic purse. Details of the transaction shall always be sent by this process to the process that manages toll transactions. Where an advanced toll payment is identified, the process shall take no action if the credit identity is on the bad payers list, or the stored credit is less than the toll cost, other than the payment is not confirmed.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following:

- (a) 'toll\_bad\_payment\_check\_response', which contains data from another process;
- (b) 'advanced\_toll\_payment\_update', which contains data to be written to a data store.

Functional Requirements: This process shall:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, generate the outputs identified above;
- (c) when the unsolicited flow requesting billing for tolls is received, check to see if it contains a credit identity, carrier identity, or a stored credit value;
- (d) if a credit identity or carrier identity is found in (c) send it to the process managing the store of bad payees for a check that it is not on the list of bad toll payments;
- (e) if a match is found in (d), get an image of the violator and output the data flow that requests the vehicle to pull in;
- (f) if a stored credit value is found in (c) and it is less than the toll cost, get an image of the violator and output the data flow that requests the vehicle to pull in;
- (g) if the stored credit value found in (c) is greater than or equal to the toll cost, send the output flow to the traveler card / payment instrument requesting that the toll cost be deducted from the credit being stored by the instrument;
- (h) if a negative response is received to (g), get an image of the violator and output the data flow that requests the vehicle to pull in;
- (i) when the toll transaction is complete always output details of the transaction in the flow of current toll transactions and send out the data flow that clears the toll tag data store;
- (j) if the payment is identified as being for an advanced toll, and a match is found in (d) or the stored credit value is less than the toll cost then set the output flow of advanced toll payment to false and take no further action;
- (k) if the tests in (j) are clear then set the output flow of advanced toll payment to true and send the updated credit and vehicle identities to processing managing the advanced payment list store;
- (l) use the appropriate mechanism(s) such as a relational database, to retrieve and write data to the store identified above;
- (m) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **7.1.1.6 Collect Probe Data From Toll Transactions**

Overview: This process shall calculate the time taken for vehicles to travel between successive toll plazas and send it to the Manage Traffic and Provide Driver and Traveler Services functions. The process shall periodically request the data from the process that manages toll financial processing and ensure that any references to the driver and/or vehicle identity plus any other payment information are removed from the data before it is sent to the other functions.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall:

- (a) periodically generate the toll\_transactions\_for\_probe\_data request data flow shown above;
- (b) when the toll\_transactions\_for\_probe\_data flow is received, calculate the average journey times between toll plazas where there is sufficient data to enable an average to be sensibly computed;
- (c) when (b) is completed, generate the two outputs of probe data identified above;
- (d) remove any credit and/or vehicle identity plus other payment information from the data obtained in the input data flow identified above.

### **7.1.1.7 Update Toll Price Data**

Overview: This process shall be responsible for maintaining a store of data containing the toll price, which may vary according to the type of vehicle. The process shall also act as the interface for the output and input of responses to toll price change requests from the Manage Traffic function, the provision of toll price information to the Centralized Payments facility, and to the toll administrator to enable changes to be made to the stored data. The input and output forms shall include those that are suitable for travelers with physical disabilities. This process supports the exchange of toll price information with the process to Manage Commercial Vehicle Fleet Operations.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following which contains data requested from a data store:

- (a) 'toll\_prices'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when any of the inputs from the toll administrator are received, generate the appropriate output identified above;
- (c) when the input for a toll prices change request is received from the Manage Transit function, generate the change request output to the toll service provider;
- (d) when a request for toll price data is received, generate the data flow containing the copy of the store of price data;
- (e) be responsible for the management of the data in the store of toll cost data, using the most appropriate mechanism(s) such as a relational database, for storing the data.

### **7.1.1.8 Register for Advanced Toll Payment**

Overview: This process shall be responsible for responding to requests for tolls to be paid in advance. It shall provide the toll administrator with the opportunity to review the requests for advanced toll payments. If approved, the advanced toll data shall be forwarded by the process to other processes for the actual toll cost to be obtained and payment transactions initiated. This process also supports the advance payment of tolls by the Manage Commercial Vehicle function.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs requesting advanced tolls are received, generate the outputs to the toll administrator identified above;
- (c) if no response is received to the flows output in (b), assume that the advanced tolls have been accepted and send the data to the advanced toll bill determination process;
- (d) if a negative response is received to the flows in (b), then output the advanced toll response data flows with the confirmation data set to fail;
- (e) when the confirm data flow is received from the bill driver for tolls process, then output the advanced toll response data flows with the confirmation data set to true;
- (f) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **7.1.1.9 Manage Toll Financial Processing**

Overview: This process shall be responsible for maintaining a log of all toll transactions that are carried out by other processes in the toll payments system. At periodic intervals the process shall output the accumulated records to the toll administrator and the archive function. It shall also output the data on request to the process that calculates probe data from the average travel time between toll plazas. The identity of the payee shall be removed from the data before it is used in any of these outputs. The process shall also be responsible for sending details of transactions to the financial institution to enable the users to be billed through their credit identities. For commercial vehicles, this will be done using the data provided by the vehicle's on-board tag and shall enable billing to the financial institution to be made by carrier. This process shall also support the reconciliation of toll charges and data with other toll administration functions.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following:

- (a) 'toll\_operational\_data' - which is an unsolicited data flow periodically sent to the Manage Toll Archive Data function.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs of transaction records are received, load the data in the data store served by the 'inout' flow shown in the above list;
- (c) when requested by the appropriate input, generate the outputs identified above;
- (d) be responsible for the management of the data in the store of toll transaction records, using the most appropriate mechanism(s) such as RDBMS, for storing the data;
- (e) remove all driver identities from the data before it is used in any output data flows;
- (f) ensure that all output flows are encrypted in such a way that it is not possible to determine the financial data being transmitted, using any form of digital or analog techniques;
- (g) periodically (not less than once per day) send the toll operational data flow to the archive function calculating the number of users for each toll segment from the collected toll costs.



### **7.1.2 Produce Roadside Displays**

Overview: This process shall be responsible for driving the displays that tell vehicles whether or not their driver's toll payment has been confirmed or rejected. The process shall receive the data for output via the displays from other processes. The data input and output forms shall use an appropriate form of display that shall be easily readable under all lighting conditions and over the range of speeds that vehicles are expected to use when passing through the toll plaza. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input data flows listed above;
- (b) when either of the inputs is received, generate the appropriate output identified above.

### **7.1.3 Obtain Toll Violator Image**

Overview: This process shall be responsible for obtaining an image of a violator for use by other processes. The form of the image data obtained by this process shall be very accurate so that there can be no mistake of the determination of the identity of the vehicle and/or driver, and shall be easily passed on by the other processes to the appropriate law enforcement agency(ies) so that punitive action may be taken. The process shall be capable of obtaining an image of the required accuracy under all lighting conditions and over the range of speeds with which vehicles will pass through the toll plaza.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input data flows listed above;
- (b) when the input data flows requesting a violator image be obtained are received, read the vehicle characteristics data being received;
- (c) use the data in (b) to generate a highly accurate image of the vehicle and/or its driver;
- (d) output the image in the violation information flow identified above.

#### **7.1.4 Provide Driver Toll Payment Interface**

Overview: This process shall be responsible for providing an interface through which drivers can request and pay for other services when paying their tolls at toll plazas. The services supported by this process include advanced payment for parking lot charges and transit fares. The process shall query the driver for sufficient information to enable the advanced parking lot charge and/or transit fare to be determined and the cost either billed to a credit identity provided by the driver's traveler card / payment instrument, or deducted from credit stored on the instrument. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the driver, the basic vehicle and the driver's payment credit identity input flows are received, check the content of the input data to ensure that there is sufficient data to enable the advanced parking lot charge and/or transit fare to be determined;
- (c) if the check in (b) is not confirmed, output an insufficient data to complete transaction message to the driver using the appropriate output flow and highlighting the missing data;
- (d) the data required in (b) about the advanced booking shall include such things as the identity of the parking lot plus the date and time for which a space is required, and/or the origin and destination of the transit route;
- (e) the data in (b) must in addition to that for the advanced booking request, also include the vehicle identity and either the driver's credit identity or the credit, stored on the traveler card/payment instrument being used by the driver;
- (f) if the check in (f) is not confirmed, output an insufficient financial data (credit identity or stored credit) to complete transaction message to the driver using the appropriate output flow;
- (g) if advanced parking lot booking is required output the appropriate flow to generate any required charges only, using the new value of the stored credit if advanced tolls were required;
- (h) if advanced parking lot booking was required in (g), when a response is received again reduce the value of the stored credit;
- (i) if an advanced transit fare is to be paid, output the appropriate flow to generate any advanced transit fares, using the new value of the stored credit generated by any advanced costs already produced from the above;
- (j) when output and response to all the advanced booking requests are complete, total up all the costs and check that they are less than the original value of the stored credit and if not output an insufficient credit message to the driver using the appropriate output flow;
- (k) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted using any form of digital or analog techniques.

#### **7.1.5 Detect Vehicle for Tolls**

Overview: This process shall be responsible for producing a vehicle's characteristics from data received by sensors located at the roadside, at or near the toll collection point. The data shall be sent by the process to another process in a form suitable for use in calculating the toll cost for the vehicle. The process shall ensure that the data includes such things as vehicle size, weight, axle count, type, identifiable features, etc.

Data Flows: Input data flow is unsolicited and output flow is solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input data flow listed above;
- (b) when the input is received, generate the output data flow identified above.

### **7.1.6 Distribute Advanced Charges and Fares**

Overview: This process shall be responsible for receiving requests for advanced payment of tolls from the parking lot charge or transit fare collection facilities within the Provide Electronic Payment Services function. It shall pass the requests on to another process in the toll collection facility, and shall return transaction success or failure details to the requesting process. The process shall also receive requests for the advanced payment of parking lot charges and transit fares from the toll payment interface process. It shall send these requests to other processes in the Provide Electronic Payment Services function and when received, return the results to the toll payment interface process.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs from other processes in the Provide Electronic Payment Services function are received, generate the advanced toll payment request output identified above;
- (c) when a response is received to the flow in (b), return it in the flow to the requesting process in the Provide Electronic Payment Services function;
- (d) when the inputs requesting advanced parking lot charge or transit fare payment are received from the toll payment interface process, generate the appropriate transfer flows to other processes in the Provide Electronic Payment Services function;
- (e) when a response is received to the flows in (d), return it in the flow to the requesting process;
- (f) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **7.1.7 Provide Traveler Card Interface for Tolls**

Overview: This process shall be responsible for providing the interface through which the payment information can be read from a vehicle tag. The process shall enable the use of the data from the tag for the purposes of paying for current tolls, plus if required, the cost of advanced parking lot charges, and/or transit fares, as well as providing the data for use in traffic flow analysis. The tag data which can be collected by the process shall include credit identity, stored credit value, and the toll segment identity at the vehicle's entry point so that a closed toll system can be used. When stored credit is used, the process shall enable the deduction of the cost of the toll and (possibly) advanced payments from the credit value on the tag. The process shall support collection of data from tags on-board a range of vehicle types including private cars or vans, commercial vehicles, transit vehicles, including those used for demand responsive transit services.

Data Flows: All input and output data flows are solicited with the exception of the following which are unsolicited input flows which activate the process, or are used to read and write data from a local data store:

- (a) 'toll\_tag\_data\_request' - which is a data flow received from the toll tag data collection process;
- (b) 'toll\_tag\_data\_needed' - which is a data flow received from the Manage Traffic function that contains a request for toll tag data;
- (c) 'ftc-toll\_tag\_data' - which is a data flow received from the traveler card terminator;
- (d) 'toll\_tag\_data\_store' - which reads/writes data from a local data store.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the first unsolicited input data flow in (a) is received, generate the output data flow containing the toll tag data;
- (c) as a result of (b) await receipt of the data flows that either request toll payment from the credit stored on the traveler card / payment instrument, or confirm that payment will be deducted from the credit identity supplied by the traveler card / payment instrument, or contain an updated version of the toll tag data with the identity of the toll segment at which the vehicle entered the toll road;
- (d) when either of the two flows in (c) is received, send the appropriate toll payment request or payment debited flow to the traveler card / payment instrument;
- (e) when the third flow in (c) is received, update the local store of toll tag data;
- (f) when the second unsolicited data flow in (a) is received, send the data flow containing tag data to the Manage Traffic function;
- (g) when the third unsolicited input flow in (a) is received, write the data to the local data store replacing any data that already exists in the store;
- (h) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques;
- (i) use the most appropriate mechanism(s) such as RDBMS, to manage the data in the store identified above.

### **7.1.8 Exchange Data with Other Toll Administration**

Overview: This process shall exchange data with similar processes in other Toll Administration functions. The other toll administration can be adjacent geographically, under control of a different jurisdiction, or part of a more complex hierarchy. The exchange of data shall include prices for comparison between administration functions. The exchange of data shall also support the reconciliation of toll charges for travelers that use more than one toll agency property.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input data flows listed above;
- (b) when the input data flows from the terminator are received, store the data for use by other processes;
- (c) when the input data flows from within the Process Electronic Toll Payment function are received pass the data on to the terminator.

### **7.2.6 Distribute Advanced Tolls and Fares**

Overview: This process shall be responsible for receiving requests for advanced payment of parking lot charges from the toll or transit fare collection facilities within the Provide Electronic Payment Services function. It shall pass the requests on to another process in the Provide Electronic Parking Lot Payment facility, and shall return transaction success or failure details to the requesting process. The process shall also receive requests for the advanced payment of tolls and transit fares from the parking lot payment interface process. It shall send these requests to other processes in the Provide Electronic Payment Services function and when received, return the results to the Parking Lot payment interface process.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs from other processes in the Provide Electronic Payment Services function are received, generate the advanced parking lot charge request output identified above;
- (c) when a response is received to the flow in (b), return it in the flow to the requesting process in the Provide Electronic Payment Services function;
- (d) when the inputs requesting advanced toll or transit fare payment are received from the parking lot payment interface process, generate the appropriate transfer flows to other processes in the Provide Electronic Payment Services function;
- (e) when a response is received to the flows in (d), return it in the flow to the requesting process;
- (f) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

#### **7.3.1.1 Register for Advanced Transit Fare Payment**

Overview: This process shall be responsible for responding to requests for transit fares to be paid in advance. The advanced transit fare data shall be forwarded by the process to other processes for the actual cost to be obtained and the payment transactions initiated.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, generate the outputs identified above;
- (c) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **7.3.1.2 Determine Advanced Transit Fares**

Overview: This process shall be responsible for receiving a request to pay an advanced transit fare. It shall obtain the required transit fare data from another process and shall then forward the data to the billing processes.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, generate the output identified above;
- (c) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **7.3.1.3 Manage Transit Fare Financial Processing**

Overview: This process shall be responsible for maintaining a log of all the transactions carried out by other processes in the Process Electronic Transit Fare Payment facility. The identity of the payee shall have been removed from the data before it is stored. At periodic intervals the process shall output the accumulated records to the transit fleet manager, the transit system operator and to another process in the Provide Electronic Payment Services function. The process shall also be responsible for sending details of transactions to the financial institution to enable the users to be billed through their credit identities. The input and output forms shall include those that are suitable for travelers with physical disabilities.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following which contains data written to and requested from a data store:  
(a) 'transit\_fare\_transaction\_records'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, load the data in the store of transaction records;
- (c) at periodic intervals, e.g. daily, generate the outputs identified above;
- (d) be responsible for the management of the data in the store of transit fare transaction records, using the appropriate mechanism(s) such as RDBMS, for storing the data;
- (e) remove all transit user identities from the data before it is loaded into the data store;
- (f) ensure that all output flows are encrypted in such a way that it is not possible to determine the financial data being transmitted, using any form of digital or analog techniques.

### **7.3.1.4 Check for Advanced Transit Fare Payment**

Overview: This process shall be responsible for checking to see if the required transit fare payment has already been made. The process shall determine the existence of an advance payment for the transit fare by comparing the received payment information with the list of advanced payments. If payment has already been made then the process shall remove the requirement for local billing. Details of each payment transaction shall be sent by the process to another process with the payment information received from the transit user removed.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, generate the outputs identified above;
- (c) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques;
- (e) remove the credit identity of the transit user from all data that is sent to another process for loading into the store of transit fare payment transactions.

### **7.3.1.5 Bill Transit User for Transit Fare**

Overview: This process shall be responsible for obtaining payment for a transit fare transaction using data provided by the transit user. The process shall achieve this either by requesting that the fare be deducted from the credit being stored by the tag that is acting as the payment instrument for the transit user, or by informing the transit user that payment for the fare will be debited to the credit identity provided by the tag. Before sending data to the tag, the process shall check that the transit user's credit identity is not already in the list of bad payers, and if it is request an image of the user which can be forwarded to the appropriate enforcement agency via another process. The tag may be in the form of cash, some type of credit or debit card, an electronic purse, or an intelligent transit ticket upon which pre-payment has been recorded, etc. Details of the transaction shall always be sent by the process to the process that manages transit fare transactions. The process shall pass details of advanced transit fare payments to another process when the transit user eventually passes a fare payment point. If requested the process shall provide a copy of the current bad payers list to processes in the transit vehicle fare collection facility for use in on-board payment validation.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above that contain data about fare billing that is needed, or is a request for a copy of the bad payers list;
- (b) when the data about fare billing is received, check any credit identity that it contains against the list of bad payers;
- (c) if a match is found in (b) then output the data flow requesting a violator image and return a fare payment failed message to the source of the billing information;
- (d) if no match is found in (b) then either request that the tag's stored credit be reduced by the amount of the fare, or send the payment information to another process for debiting via the financial institution;
- (e) as a result of (d), send a fare payment successful message to the source of the billing information;
- (f) if the deduction of the fare from the tag's stored credit in (d) fails then output the data flow requesting a violator image and return a fare payment failed message to the source of the billing information;
- (g) if in (d) the payment information is sent to another process for output to the financial institution, then output a fare payment debited message to the source of the billing information;
- (h) if the billing information was for the advanced payment of a transit fare, then on successful completion of the payment transaction in the previous steps, provide the data about the source of the payment and the fare to which it applies to the advanced payment function;
- (i) when the data flow received in (a) is a request for a copy of the bad payers list, read the current list and send it to the requesting process;
- (j) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **7.3.1.6 Collect Bad Transit Fare Payment Data**

Overview: This process shall be responsible for maintaining a list of invalid transit user credit identities. The process shall use this data to check credit identities provided for checking by the billing process. This checking shall ensure that the current transit fare payment transaction is using a credit identity that has not previously had an invalid transaction. Details of possible invalid credit identities shall be sent by the process to the financial institution for verification. The process shall also receive from the financial institution details of invalid traveler card / payment instrument data that has been found by other means.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the inputs are received, generate the outputs identified above;
- (c) be responsible for the management of the data on bad transit user traveler card / payment instrument data, using the most appropriate mechanism(s) such as RDBMS, for storing the data;
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **7.3.1.7 Update Transit Fare Data**

Overview: This process shall be responsible for managing the actual value of transit fares for each segment of each regular transit route. The process shall also act as the interface through which the transit system operator can output and make changes to the data, and copies of this data can be provided to the Centralized Payments facility on request. The process shall support inputs from the transit system operator. The process shall automatically output the new fares for use by processes on-board a transit vehicle and at the roadside, as well as by other ITS functions.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following:

- (a) 'transit\_fares\_for\_advanced\_payments'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input data flows from the transit system operator listed above;
- (b) when the input requesting output of the current data is received, generate the output of fares to the operator using the data flow identified above;
- (c) when the input containing new fare data is received, forward the new data to the advanced fares process;
- (d) when a request for transit fare price data is received, generate the data flow containing the copy of the price data.



### **7.3.2 Distribute Advanced Tolls and Parking Lot Charges**

Overview: This process shall be responsible for receiving requests for advanced payment of transit fares from the toll and parking lot charge collection facilities within the Provide Electronic Payment Services function. It shall pass the advanced fare requests on to another process in the Process Electronic Transit Fare Payment facility, and when received, shall return transit success or failure details to the requesting process. The process shall also receive requests for advanced payment of tolls and parking lot charges from transit vehicle and roadside (transit stop) fare collection facilities. It shall send these requests to other processes in the Provide Electronic Payment Services function and when received, return the results to the requesting process.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input data flows listed above;
- (b) when the inputs from other processes in the Provide Electronic Payment Services function are received, generate the advanced fare request output identified above;
- (c) when a response is received to the flow in (b), return it in the flow to the requesting process in the Provide Electronic Payment Services function;
- (d) when the inputs requesting advanced toll or parking lot charge payment are received, generate the appropriate transfer flows to other processes in the Provide Electronic Payment Services function;
- (e) when a response is received to the flows in (d), return it in the flow to the requesting process in the transit vehicle or roadside;
- (f) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **7.3.3 Get Transit User Image for Violation**

Overview: This process shall be responsible for obtaining an image of a transit user who is trying to carry out an invalid fare payment transaction. The process shall send the image request to other processes either at the roadside, i.e., a transit stop, or on-board a transit vehicle, depending on where the transaction is being attempted. However if the collection method is set to batch, then the process shall take no further action, as an image of the offending transit user will not be available. When the image is received, the process shall use it to form part of the data sent to a process in the Manage Emergency Services function for forwarding to the appropriate enforcement agency.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input flows listed above;
- (b) when the input requesting a violator image is received, check to see if the roadside or vehicle identity is set, i.e. non-zero;
- (c) generate the output to the vehicle or roadside using the data flows identified above depending on which identity is set;
- (d) when the input corresponding to the output in (b) is received, generate the fare violation information output identified above to the process in the Manage Emergency Services function;
- (e) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **7.3.4 Provide Remote Terminal Traveler Card Interface**

Overview: This process shall be responsible for providing the interface through which payment information can be read from a transit user traveler card. The process shall support reading this data from transit users at the roadside, e.g., a transit stop, for use in paying the current transit fare and (if required) advanced payments. The process shall support advanced payments for tolls, parking lot charges, and/or transit fares. The process shall collect either the credit identity or the stored credit value data from the traveler card, and update the stored credit value as a result of the fare and (possibly) advanced charges.

Data Flows: All input and output data flows are solicited with the exception of the following which is an unsolicited input flow that activates the process:

(a) 'frc-transit\_roadside\_tag\_data' - which is a flow received from the traveler card terminator.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flow listed above;
- (b) when the input is received, generate the output data flow containing transit roadside tag data;
- (c) as a result of (b) await receipt of the data flows that either request transit fare payment from the credit stored on the traveler card / payment instrument or confirm that payment will be deducted from the credit identity supplied by the traveler card / payment instrument;
- (d) when either of the flows in (c) is received, send the appropriate transit fare payment request or payment debited flow to the traveler card / payment instrument;
- (e) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog technique.

### **7.3.5 Provide Transit Vehicle Traveler Card Interface**

Overview: This process shall be responsible for providing the interface through which the payment information can be read from a transit user traveler card. The process shall support the reading of this data from transit users embarking on-board transit vehicles, for use in paying the current transit fare, and if required, advanced payments. The process shall support advanced payments for tolls, and/or parking lot charges, and/or transit fares. It shall be possible for the process to collect either the credit identity or the stored credit value data from the traveler card, and to update the stored credit value as a result of the fare and (possibly) advanced charges having been paid.

Data Flows: All input and output data flows are solicited with the exception of the following which is an unsolicited input flow that activates the process:

(a) 'frc-transit\_vehicle\_tag\_data' - which is a flow received from the traveler card terminator.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flow listed above;
- (b) when the input is received, generate the output data flow containing transit vehicle tag data;
- (c) as a result of (b) await receipt of the data flows that either request transit fare payment from the credit stored on the traveler card / payment instrument or confirm that payment will be deducted from the credit identity supplied by the traveler card / payment instrument;
- (d) when either of the flows in (c) is received, send the appropriate transit fare payment request or payment debited flow to the traveler card / payment instrument;
- (e) all input and output flows must be encrypted in such a way that it is not possible to determine the credit identity or stored credit value being transmitted using any form of digital or analogue technique.

#### **7.4.1.2 Process Yellow Pages Services Provider Payments**

Overview: This process shall be responsible for transacting payments for the registration of other (yellow pages) service providers. The process shall be initiated by receiving data from a process in the Provide Driver and Traveler Services function and shall send the data to the financial institution. The process shall send the response from the financial institution to the requesting process and shall send details of the transaction to another process for entry into a store of transaction records.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input data flows listed above;
- (b) when the input is received from the Provide Driver and Traveler Services function, generate the output to the financial institution identified above;
- (c) as a result of (b) await the response from the financial institution and when received, use it to generate the reply to the requesting process;
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

#### **7.4.1.3 Process Driver Map Update Payments**

Overview: This process shall be responsible for transacting payments from the driver for updates to the navigable map database in the vehicle. The process shall receive the transaction request data from a process in the Provide Driver and Traveler Services function and shall send the data to the financial institution for action. The process shall send the response from the financial institution to the requesting process and shall send details of the transaction to another process for entry into the payment\_transaction\_records data store.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the input is received from the Provide Driver and Traveler Services function, generate the output to the financial institution identified above;
- (c) as a result of (b) await the response from the financial institution and when received, use it to generate the reply to the requesting process;
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

#### **7.4.1.4 Process Traveler Map Update Payments**

Overview: This process shall be responsible for transacting payments from the traveler for updates to the navigable map database carried in the personal device. The process shall receive the transaction request data from a process in the Provide Driver and Traveler Services function and shall send the data to the financial institution. The process shall send the response from the financial institution to the requesting process and shall send details of the transaction to another process for entry into the payment\_transaction\_records data store.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the input is received from the Provide Driver and Traveler Services function, generate the output to the financial institution identified above;
- (c) as a result of (b) await the response from the financial institution and when received, use it to generate the reply to the requesting process;
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

#### **7.4.1.5 Process Transit User Other Services Payments**

Overview: This process shall be responsible for collecting advance payments for other (yellow pages) services. The transaction data shall be provided by processes in the Manage Transit function in response to reservation requests from a transit user either at the roadside, i.e., a transit stop, or on-board a transit vehicle. The process shall send the received transaction data to the financial institution and shall send the response to the requesting process. It shall also send details of the transaction to another process for entry into a store of transaction records.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the input is received from the Manage Transit function, generate the output to the financial institution identified above;
- (c) as a result of (b) await the response from the financial institution and when received, use it to generate the reply to the requesting process;
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

#### **7.4.1.6 Process Traveler Trip and Other Services Payments**

Overview: This process shall be responsible for transacting advanced payments required for the confirmation of a trip by a traveler. Payments supported by the process shall comprise those for any tolls, parking lot charges, transit fares, or other (yellow pages) services that need to be paid for the trip to be confirmed. The process shall receive the transaction data from a process in the Provide Driver and Traveler Services function and shall send the data to the financial institution. Tolls, fares and parking lot charges are sent to the Route Traveler Advanced Payment function for processing. The process shall send the response from the financial institution to the requesting process and shall send details of the transaction to another process for entry into the payment\_transaction\_records data store.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the input is received from the Provide Driver and Traveler Services function, generate the output to the financial institution identified above;
- (c) as a result of (b) await the response from the financial institution and when received, use it to generate the reply to the requesting process;
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

#### **7.4.1.7 Collect Payment Transaction Records**

Overview: This process shall be responsible for the collection and maintenance of a data store that contains transaction records for payments made for various services provided. The process shall load information into the data store for services comprising updates of map databases for drivers and travelers, registration of other (yellow pages) service providers (so that information about what they have to offer is available to travelers and transit users), advanced payment of tolls, parking lot charges, transit fares and other (yellow pages) services that form part of travelers' trips. The data shall be stored by the process with all references to the identity of the payment source, i.e., driver, traveler, commercial vehicle fleet manager, and any other payment information, removed.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following which contains data requested from a data store:

- (a) 'payment\_transaction\_records'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the input is received, generate the outputs identified above;
- (c) be responsible for the management of the data in the store of payment transactions, using the most appropriate mechanism(s) such as RDBMS, for storing the data;
- (d) ensure that all references to the identity of those making the payments to which the transaction records relate are removed from the data before it is loaded into the store identified above;
- (e) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

#### **7.4.2 Collect Price Data for ITS Use**

Overview: This process shall be responsible for collecting data about the prices being charged for tolls, parking lots and transit fares. This process shall accept data sent to it by the other processes when they have updated their data and automatically sent it, or this process shall request a transfer of data from the other processes. The process shall load the data into the price\_data\_for\_services data store from which some or all of it can be read on request from processes in other ITS functions. When requested, this process shall provide the price information.

Data Flows: All input data flows are unsolicited and all output flows are solicited with the exception of the following which contains data written to and requested from a data store:  
(a) 'price\_data\_for\_services'.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the input data flows listed above;
- (b) when inputs of data are received, load their contents into the data store identified above;
- (c) when the inputs requesting data are received, read the required data from the store and generate the output data flows identified above;
- (d) periodically generate the data flows listed above requesting the current toll and parking lot prices plus transit fare data;
- (e) be responsible for the management of the data in the store of the prices for services, using the most appropriate mechanism(s) such as RDBMS, for storing the data;
- (f) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

#### **7.4.3 Route Traveler Advanced Payments**

Overview: This process shall be responsible for receiving a traveler's request for advanced payment (for tolls, parking lot charges, and/or transit fares) and routing it to the appropriate part of the Provide Electronic Payment Services function. The process shall also receive responses to the advanced payment requests and shall return them to the originating process. This process also supports requests for advanced payment information from the Manage Commercial Vehicle function.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the traveler advanced payments request flow listed above;
- (b) when the flow in (a) is received, interrogate the data and generate the appropriate advanced fare, toll or charge request flow identified above;
- (c) when all of the resulting responses have been received, generate the traveler advanced payments response flow listed above;
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **7.5.1 Provide Vehicle Traveler Card Interface**

Overview: This process shall be responsible for providing the interface through which driver credit identities and stored credit may be entered into the ITS from on-board vehicle tags. The types of vehicles from which data is collected shall include private cars or vans, commercial vehicles, and transit vehicles, including those used for demand responsive transit services. This process shall also provide an interface through which the stored credit held by the tag can be debited for the payment of current or advanced tolls, plus advanced parking lot charges, and/or transit fares. This process also supports the payment of enrollment for Commercial Vehicles.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flow listed above;
- (b) when the input is received, generate the appropriate one of the outputs identified above;
- (c) when either of the input flows requesting a reduction in stored credit is received, generate the appropriate flow to reduce the credit currently stored on-board the traveler card / payment instrument;
- (d) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **7.5.2 Provide Transit User Roadside Traveler Card Interface**

Overview: This process shall be responsible for providing the interface through which credit identities and stored credit values may be collected from tags being used by transit users. The process shall support the collection of this data at the roadside (which in this instance is a transit stop). Payments by the transit user for fares, other services, payment of advanced tolls, and/or parking lot charges shall be supported by the process. It shall also provide an interface through which stored credit held by the tag can be debited for the same types of payment.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the input is received, generate the appropriate outputs identified above;
- (c) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

### **7.5.3 Provide Personal Traveler Card Interface**

Overview: This process shall be responsible for providing the interface through which credit identity, stored credit, or traveler information may be collected from the traveler card being used by a traveler with a personal device. The process shall support the collection of this data from any location in which the device (and hence the traveler card) is being used. It shall provide an interface through which the credit identity can be used for the payment of advanced tolls, parking lot charges, transit fares, display updates, and/or map updates. The process shall also enable the stored credit value on the tag to be used for the same purposes.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the input is received, generate the appropriate outputs identified above;
- (c) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.

#### **7.5.4 Provide Traveler Kiosk Traveler Card Interface**

Overview: This process shall be responsible for providing the interface through which credit identities and stored credit values may be collected from traveler cards / payment instruments being used by travelers. The process shall support the collection of data at the roadside (which in this instance is a kiosk) and use this data for payments needed to confirm a traveler's trip. Payments supported by the process shall include those for advanced tolls, parking lot charges, transit fares, and/or other (yellow pages) services. It shall also provide an interface through which the stored credit held by the traveler card can be debited for the same types of payment.

Data Flows: All input data flows are unsolicited and all output flows are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the input is received, generate the appropriate outputs identified above;
- (c) all input and output flows must be encrypted in such a way that it is not possible to determine the payment information being transmitted, using any form of digital or analog techniques.



## 8.1 Get Archive Data

Overview: This process shall collect data from each major function within ITS and external sources for archive purposes that may not exist within current ITS data sources. This process shall respond to requests from the Manage Archive Data Administrator Interface process to import data or data catalogs. This process shall send requests for data or a catalog of available data to the other functions and terminators, either a subscription for data or a one-time request. This process shall receive meta-data along with the data to describe the conditions under which the data was collected or any other information about the operational data. When data is received this process shall perform quality checks such as range validation or reformat the data as necessary to meet the archive schema. This process shall execute methods on the incoming data such as cleansing, summarizations, aggregations, or transformations applied to the data before it is stored in the archive. Any changes made to the data shall be recorded in the meta-data stored in the archive to assist in the reconstruction of the original data if possible. This process shall receive inputs from the Manage Archive Data Administrator Interface that contain the parameters for managing the processing on the data. This process forwards the collected onto the Manage Archive function along with updated meta-data and a record of any methods applied to the incoming data. This process shall also support the notification of the operational source functions of any errors that may be present in the data that could be caused by equipment failures or a transmission error.

Data Flows: The input data flow `import_administration_request` is unsolicited. The other input data flows of the form `xxx_archive_data` are solicited by the process during a one-time request operation; subsequent data sent as part of a subscription operation shall be received as unsolicited input. All outputs from this process are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the unsolicited data input `import_administration_request` is received, the process shall generate the solicited output flow of the form `xxx_archive_request` where `xxx` is the source for the data requested;
- (c) when the data `xxx_archive_data` is received, either unsolicited as part of a subscription arrangement or solicited in response to the request issued in (b), the process shall received the data and format it per the information contained in the `import_administration_request` flow received in (b);
- (d) when the input data has been formatted the process shall send the data to the Manage Archive function;
- (e) the process shall update the meta data of the received data to describe any formatting steps performed in (c);
- (f) the process shall generate the solicited output `import_administration_status` to inform the Manage Archive Administrator Interface function of the status of the import process and to include the catalog of data requested and available from the source function;
- (g) when data is received from an input source, the process shall generate solicited output `xxx_archive_status` to notify the source of any errors in the received data.

## 8.2 Manage Archive

Overview: This process shall store the collected and formatted data in a permanent archive data store. This process shall receive the formatted data from the Get Archive Data function accompanied by any updates to the meta data that would describe the formatting operations performed on the data as it was imported.

This process shall respond to requests from the administrator interface function to maintain the schema of the archive data, set update frequencies, backup schedules, user authentication schemes, cleansing algorithms.

This process shall provide the administrator interface function with status of the data quality in the archive, frequency reports on use of the archive, updates to the measure of the volume of the data and other data archive metrics. This process shall receive inputs from the Coordinate Archives function to provide data and information about the archive schema to other archives. In turn the process shall receive data and schema of other archives to use to build a global schema. The process shall use the global schema to support requests from user systems for data that may be spread across multiple archives. The process shall maintain the access privileges information for the data held in the archive to maintain the security of the archive. The process shall employ such techniques as necessary to maintain the integrity of the data and ensure no data is lost from the archive. The process shall respond to requests for data to support user data products, user analysis, and inputs to government reporting systems. The process shall respond to such request by authenticating the originator of the request and providing the data that is available. The process shall also be capable of providing a sample or catalog of data contained within the archive to support the user requests.

Data Flows: All inputs to this process are unsolicited and all outputs from this process are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when the unsolicited data input `retrieved_archive_data` is received, the process shall update the data store;
- (c) when the unsolicited data input for `administration_request` is received, the process shall respond with the solicited data output `administration_status`;
- (d) when the input flows requesting data from the archive are received, the process shall authenticate the user can access to the data, determine the location of the data, whether local or in another archive, and generate the requested data output.

### 8.3 Manage Archive Data Administrator Interface

Overview: This process shall interface with the Archive Data Administrator terminator and receive inputs from the administrator concerning the management and administration of the archive. The process shall establish user authentication controls for the archive and send the information to the Manage Archive function. The process shall maintain the schema of the archive, including the data and meta data contained within the archive data. Updates to the schema shall be distributed to the Manage Archive function as well as the Get Archive Data function. The process shall send the parameters and requests to the Get Archive Data function to control what data is imported into the archive and how the data is to be formatted when it is received. The parameters sent shall include such things as the schema, data format, methods to apply to the data, cleansing parameters, quality metrics, and checking specifications. The process shall send requests to the Get Archive Data function for new data or a catalog of data that may be available. The process shall respond to requests from the Manage On Demand Archive Requests function by making requests of the Get Archive Data function to establish the source and identity of the data that may exist in ITS or non-ITS sources. Then the process shall respond to the user request with the confirmation that the request can be satisfied and specifications about the data once it is imported. In cases where the Manage Archive function will be managing a roadside data collection function, this process shall initiate and control the function by sending commands and requests to the Manage Roadside Data Collection function. This process receives the status from the other functions within Manage Archived Data and presents them to the administrator.

Data Flows: All input flows are solicited with the exception of 'fada-archive\_administration\_requests' and 'on\_demand\_archive\_requests' which are unsolicited. All outputs are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flow listed above;
- (b) when the input is received from the administrator, generate the appropriate output data flow;
- (c) when the input is received from the on demand request function, generate the output to the Get Archive Data function;
- (d) when status flows are received, generate the output for the administrator;
- (e) all input and output flows regarding the security of the archive must be encrypted in such a way that it is not possible to determine the user identity or password authentication methods for any user.

## **8.5 Process Archived Data User System Requests**

Overview: This process shall monitor the archive data user systems interface for requests for data from the archive. This process shall support requests from users involved in planning, research, safety, as well as operations of transportation functions. This process shall receive requests for data and catalogs of data that may be contained in the archive. This process shall translate the requests into a format that can be understood by the Manage Archive function to retrieve data from the archive. When data or a catalog of data is received from the archive, this process shall generate the requested data product for the users systems. For archive data requiring financial payment this archive process the financial requests and manages an interface to a Financial Institution.

Data Flows: All input and output flows are solicited with the exception of fadu-archive\_data\_product\_request which is unsolicited.

Functional Requirements: This process shall satisfy the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when a request is received from a user system, generate the request output to forward the request to the Manage Archive function;
- (c) when the data is received from the archive, either the catalog of data, the data itself, or meta data; immediately generate the output to the user system;
- (d) before output, the process shall put the data into a format that is easily read and interpreted by external processes.

## **8.6 Analyze Archive**

Overview: This process shall support the interface with Archive Data User Systems for requests for analysis of the archive data. This process shall support analysis products that can provide users with the ability to perform activities such as data mining, data fusion, summarizations, aggregations, and recreation from archive data. This process shall receive the users systems requests and develop the request that the Manage Archive function can process to retrieve the data from the archive. This process shall be able to respond to users systems requests for a catalog of the analysis products available. When data and meta data are returned from the archive and the analysis is performed this process shall produce the output for the Archive Data User Systems terminator. For archive data requiring financial payment this archive process the financial requests and manages an interface to a Financial Institution.

Data Flows: All input and output flows are solicited with the exception of fadu-archive\_analysis\_request which is unsolicited.

Functional Requirements: This process shall satisfy the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when a request is received from a user system, generate the request output to forward the request to the Manage Archive function;
- (c) when the data is received from the archive, either the catalog of data, the data itself, or meta data; immediately perform the analysis requested and generate the output to the user system;
- (d) before output, the process shall put the data into a format that is easily read and interpreted by external processes.

## **8.7 Process On Demand Archive Requests**

Overview: This process shall receive requests for data to be imported into the archive that is not already in the archive. The process shall forward the request to the Manage Archive Data Administrator Interface function for the administrator to handle the user request. The process shall receive the response from the administrator and forward the information to the Archive Data User System.

Data Flows: All input and output flows are solicited with the exception of fadu-on\_demand\_archive\_request which is unsolicited.

Functional Requirements: This process shall satisfy the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flows listed above;
- (b) when a request is received from a user system, generate the request output to forward the request to the Manage Archive Data Administrator Interface function;
- (c) when the response is received from the administrator, generate the output to the user system;
- (d) before output, the process shall put the data into a format that is easily read and interpreted by external processes.

## **8.8 Prepare Government Reporting Inputs**

Overview: This process shall support the preparation of inputs to reporting systems of the federal or state governments that require data from the ITS archive. This process shall respond to requests from the Government Reporting Systems terminator for data from the archive and generate the request in a form understood by the Manage Archive function. The data and any meta data necessary shall be returned from the Manage Archive function. This process shall receive the data and format it as requested and send it to the Government Reporting Systems terminator where it may be combined with other data before final submission.

Data Flows: All input and output flows are solicited with the exception of fgns-government\_data\_report\_request which is unsolicited.

Functional Requirements: This process shall satisfy the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input listed above;
- (b) upon receipt of the input listed in (a), generate the data request to the Manage Archive function to provide the data required from the archive;
- (c) upon receipt of the returned data requested in (b), generate the output to the Government Reporting Systems terminator.

## **8.9 Manage Roadside Data Collection**

Overview: This process shall manage the collection of archive data directly from collection equipment located at the roadside. This process shall collect traffic information as well as environmental or other information that may be collected by roadside devices. This process shall respond to requests from the Manage Archive Data Administer Interface process to input the parameters that control the collection process. The request for data and control parameters shall be sent to the Manage Traffic function where the information is collected and returned. This process shall forward the data onto the Get Archive Data function for import into the archive. The Get Archive Data function shall be able to return status about the imported data. This process shall use the status information to adjust the collection function and report back to the administrator function.

Data Flows: All input flows are unsolicited with the exception of collected\_roadside\_data\_status and roadside\_archive\_data which are unsolicited. All outputs are solicited.

Functional Requirements: This process shall meet the following functional requirements:

- (a) continuously monitor for receipt of the unsolicited input flow listed above;
- (b) when the input is received from the administrator, generate the appropriate output data flow;
- (c) when data is received from the roadside\_archive\_data, check the data for errors and forward the data to the Get Archive Function on output collected\_roadside\_data;
- (d) update the collection\_administration\_status upon receipt of the archive data and the status from the Get Archive Data function.

### **9.1.1 Manage M&C Systems On-Board**

Overview: This process shall use on-board vehicle sensors to monitor roadway infrastructure conditions (e.g. pavement cracks) and vehicle operational functions, including operating status (e.g. materials stored, materials usage, plow blade up/down etc.). It shall receive control information from the vehicle operator. It shall also receive control information from the Manage M&C Vehicle Fleet function to allow remote operation of the on-board vehicle systems. These systems shall include winter maintenance equipment for plowing, treating, and anti-icing, and routine maintenance equipment for cutting, repairs, hazard removal, etc. This process shall communicate status information to other maintenance, construction, or specialized service vehicles.

Functional Requirements: None.

### **9.1.2 Collect M&C Vehicle Data On-Board**

Overview: This process shall collect and process non-ITS data available from sensors on-board maintenance, construction, and specialized service vehicles. This includes vehicle diagnostics, operating conditions (status of the brake system, oil pressure, tire wear, etc.), and safety status. This data shall be sent by this process to other processes in the Manage M&C Vehicles function for use in determining vehicle schedule deviations, scheduling vehicle maintenance, monitoring safety status, and informing the vehicle operator of the conditions. This process shall receive inputs from Process Vehicle Location Data to determine the current position of the maintenance or construction vehicle and shall forward it to the Track M&C Vehicle function.

Functional Requirements: None.

### **9.1.3 Track M&C Vehicles and Equipment**

Overview: This process shall track public and contracted fleets of maintenance, construction, and specialized service vehicles and associated equipment. Based upon the vehicle location data received as input, this process shall generate current and past vehicle locations, vehicle speed information, and location analysis data (e.g. average speed). This data provides the Manage M&C Vehicle Fleet function a complete view of the fleet locations and speeds. This data, together with similar location and status data about maintenance and construction equipment, shall be provided to the maintenance and construction center personnel. The types of vehicles and equipment tracked include roadway maintenance or construction trucks and motorized equipment, snow plows, salt/sand trucks, bucket trucks, vegetation control and grass cutting equipment, traffic control vehicles, street and drainage cleaning vehicles, among others.

Functional Requirements: None.

### **9.1.4 Manage M&C Vehicle Fleet**

Overview: This Maintenance and Construction fleet management process shall dispatch and route maintenance and construction vehicle drivers and support them with route-specific environmental, incident, and traffic congestion information. This process shall remotely control maintenance and construction vehicle on-board equipment. Fleet health information shall be collected from the Schedule M&C Vehicle Maintenance function, and location tracking data and analysis of the fleet shall be received from the Track M&C Vehicle function. This function shall receive information from the storage facility about the status of maintenance and construction vehicles and equipment. This process shall respond to requests for vehicle resources with fleet and equipment availability information. Specific instructions shall be provided to this process by the Maintenance and Construction Center Personnel Interface.

Functional Requirements: None.

### **9.1.5 Schedule M&C Vehicle Maint**

Overview: This process shall collect the vehicle condition diagnostics information from maintenance and construction vehicles and automatically schedule preventive and corrective vehicle maintenance with the Equipment Repair Facility. This process shall receive fleet health reports, including maintenance records, from that repair facility and provide the data to the Manage M&C Vehicle Fleet function. To better predict and schedule necessary equipment repairs, the Manage M&C Vehicle Fleet function provides information on the vehicle utilization and vehicle availability schedules.

Functional Requirements: None.

### **9.1.6 Provide M&C Vehicle Operator Interface for Maint**

Overview: This process shall manage the interface to the operator of the maintenance or construction vehicle. This process shall receive inputs from the vehicle operator such as requests for status from on-board systems, field equipment status, and work activity status. This process shall forward to the vehicle operator from the maintenance and construction vehicle fleet manager new dispatch orders including routing information or updates to weather or road network conditions in the area. This function shall also receive recommended road treatment and maintenance actions from the Manage Maintenance Decision Support function. This process shall then formulate the output to the vehicle operator either in digital screen displays or audio formats based on received input from the on-board systems.

Functional Requirements: None.

### **9.1.7 Process Road Network Information**

Overview: This process shall gather information about the road network specifically to support the Manage Maintenance and Construction function. The data collected by this process shall include incident information and response status, traffic information, roadway restrictions, and environmental information. This data shall then be processed to provide a maintenance and construction view of the road network that is forwarded to vehicle fleet dispatchers, center personnel, and the maintenance decision support function.

Functional Requirements: None.

### **9.2.1 Schedule M&C Activities**

Overview: This process shall generate new maintenance, construction, and work zone activity schedules for use by maintenance and construction vehicles, maintenance and construction operators, and for information coordination purposes with other ITS functions. This process shall also schedule assets for use in maintenance activities and work zone activities. The process shall use parameters and input data set up by the maintenance center personnel, roadway network information, data gathered from the roadway, data input from the maintenance vehicle fleet management, and knowledge of assets within the infrastructure. The process shall also respond to requests from the Determine M&C Needs function. The process shall send its output to other functions in the Manage Maintenance and Construction function for archival, fleet dispatch and routing, and coordination of work plans with other agencies.

Functional Requirements: None.



## **9.2.2 Status Current M&C Activities**

Overview: This process shall assess the current status of all maintenance and construction activities and provide the information to center personnel, other agencies, and functions within Manage Maintenance and Construction to support the vehicle fleet manager and maintenance needs assessment. This status shall include actual work activities performed, current locations and operational conditions of M&C vehicles, asset inventories, materials and equipment inventories, field equipment status, environmental information, work zone status, etc. Asset usage restrictions, such as height, width, or weight requirements, whether permanent or temporary due to maintenance and construction activity, shall be gathered from Asset Management and communicated to other agencies. Incident information gathered by this function shall be forwarded to emergency and traffic management functions.

Functional Requirements: None.

## **9.2.3.1 Determine Winter Roadway Treatment Needs**

Overview: This process shall determine the need for roadway treatment based on current and forecasted weather information, current usage of treatments and materials, available resources, requests for action from other agencies, and recommendations from the Provide M&C Maintenance Decision Support function, specifically under winter conditions. This shall include winter maintenance such as plowing, treating, anti-icing, etc. Once roadway treatment needs are established by this process, the recommended treatment shall be output to the Schedule M&C Activities or directly to the Manage M&C Vehicle Fleet function, depending upon the urgency of the request. A record of winter maintenance needs shall be output to another process for archival.

Functional Requirements: None.

## **9.2.3.2 Determine Roadway M&C Needs**

Overview: This process shall determine the need for roadway maintenance and construction activities based on current and forecasted weather information, current usage of treatments and materials, available resources, requests for action by other agencies, identification of faulty roadside equipment, and recommendations from the Provide M&C Maintenance Decision Support function. This shall include routine maintenance such as cleaning, cutting, field equipment repair, etc. This process shall collect sensor status, identify fault conditions, and log faults that have been detected by processes in the Manage Maintenance and Construction and Manage Traffic functions. Once roadway treatment needs are established by this process, the recommended maintenance activity shall be output to the Schedule M&C Activities function or directly to the Manage M&C Vehicle Fleet function, depending upon the urgency of the request. A record of roadway maintenance needs shall be output to another process for archival.

Functional Requirements: None.

### **9.2.3.3 Provide Maintenance Decision Support**

Overview: This process shall provide decision support to the maintenance and construction center personnel and maintenance and construction field personnel. This process shall tailor external information for the decision maker. Some of the external information used could be weather or road condition observations, forecasted weather information or road conditions, current usage of treatments and materials, available resources, equipment and vehicle availability, road network information, and source reliability information. The tailoring of information may include filtering (selection from a large amount of external information), error reduction ('smoothing' the information), fusion (combination of disparate information to match the decision needs), analysis (creating the decision), and information presentation to the operator. The center or field personnel shall be able to input control parameters for the decision support process. The center or field personnel shall be able to interactively provide inputs and receive decisions or information presentation. The maintenance decision recommendations shall be distributed to other processes within the Determine M&C Needs function.

Functional Requirements: None.

### **9.2.3.4 Manage M&C Resource Needs**

Overview: This process shall coordinate resources with other ITS functions, including Manage Traffic, Manage Emergency Services, and other Manage Maintenance and Construction processes based on scheduled M&C work activity plans, and equipment, materials, and vehicle availability. Equipment availability and status from the Storage Facility, Equipment Repair Facility, and Asset Management shall be collected by this process, and equipment and materials resupply requests to the Maintenance and Construction Administrative Systems shall be submitted and tracked. This process shall also output information on M&C resources available to assist other Manage Maintenance and Construction processes that address M&C personnel and equipment needs, including work zones. Resource requests shall be sent on to Center Personnel for concurrence. This process shall output information on available resources to the Provide M&C Maintenance Decision Support function, and receive inputs on recommendations for road maintenance actions. A record of maintenance needs shall be output to another process for archival.

Functional Requirements: None.

### **9.2.3.5 Collect Roadside Equipment Status**

Overview: This process shall collect the status and fault data from roadside equipment, such as traffic, infrastructure, and environmental sensors, highway advisory radio and dynamic message signs, automated roadway treatment systems, cameras, traffic signals and override equipment, ramp meters, beacons, etc., and provide a cohesive view of equipment repair needs to another maintenance and construction function to arrange repair. A record of the fault information shall also be sent to the Manage Archived Data function for archival.

Functional Requirements: None.

#### **9.2.4 Manage M&C Map Data**

Overview: This process shall provide updates to the store of digitized map data used as the background for displays of maintenance and construction activity status including work zone activities, routing maps, and vehicle fleet and equipment locations produced by processes in the Manage Maintenance and Construction function. The process shall obtain the new data from a specialist data supplier or some other appropriate data source. The process shall be able to request a map update from a specialist data supplier or some other appropriate data source.

Functional Requirements: None.

#### **9.2.5 Provide M&C Center Personnel Interface for Maint**

Overview: This process shall manage the interface to the maintenance and construction center personnel for maintenance, construction, and work zone operations. This process shall receive inputs from the M&C Center Personnel concerning schedule and data archival parameters, dispatch information, advanced maintenance decision support parameters, or responses to requests from other agencies for resources. This process shall also display outputs to the center personnel such as work activity schedule updates, M&C fleet tracking information, environmental and road network information, maintenance decision support system recommendations, vehicle speeds and work activity status in work zones, or flashes of new requests from other management functions within ITS. This process shall also display work zone device status and work zone video images to the center personnel. Maintenance and construction activity, vehicle, and equipment status shall be presented to the M&C Center Personnel in a map-based format.

Functional Requirements: None.

#### **9.2.6.3 Operate Infrastructure Monitoring Devices**

Overview: This process shall remotely monitor and manage infrastructure sensors located both on the roadway and the maintenance and construction vehicle. Control information shall be issued to the sensor equipment, while data and status shall be collected. Sensor data, both raw and processed, detailing roadway infrastructure conditions shall be forwarded to another process which schedules repair. Similar information shall be sent to the Managed Archived Data function for archival, and to Asset Management for their records. Fault information about the sensors themselves shall be forwarded to another process to arrange field or vehicle sensor equipment repair.

Functional Requirements: None.

### **9.2.7 Manage M&C Archive Data**

Overview: This process shall process requests for maintenance and construction archive data and provide that data gathered from the roadway, traffic, and other maintenance and construction sources. Archived maintenance and construction data shall include work zone data, automated treatment system data, data about maintenance and construction resource requests and needs, activity schedules and status, and field device status. This process shall receive and respond to requests from the Manage Archived Data process for either a catalog of the data contained within the M&C data stores or for the data itself. Additionally, this process shall be able to produce sample products of the data available. As data is received into this process, quality control metrics shall be assigned. The appropriate meta-data shall be generated and stored along with the data. The process shall run when a request for data is received from an external source, or when fresh data is received. Data from this process shall also be sent to Asset Management to assist in maintaining a current record of transportation assets.

Functional Requirements: None.

### **9.2.8 Manage M&C Materials**

Overview: This process shall monitor the amount and availability of materials at storage facilities and provide that information upon request to the Status Current M&C Activities function and to the maintenance and construction resource needs manager.

Functional Requirements: None.

#### **9.3.1.1 Operate Work Zone Devices**

Overview: This process shall monitor, operate, and control work zone devices located at or alongside the roadway. The devices operated include driver information devices (e.g. dynamic message signs and highway advisory radio), imaging devices (e.g. closed circuit television), and work zone intrusion detection and alert devices.

Functional Requirements: None.

#### **9.3.1.2 Operate WZ Devices On-Board**

Overview: This process shall monitor, operate, and control work zone devices located on the maintenance and construction vehicle. The process shall monitor, operate, and control from a maintenance and construction vehicle work zone devices located at or alongside the roadway. The devices operated on board the vehicle include driver information devices (e.g. dynamic message signs) and work zone intrusion detection and alert devices. The roadside devices operated and controlled include driver information devices.

Functional Requirements: None.

### **9.3.1.3 Monitor Crew Movement**

Overview: This process shall monitor the crew movements to identify when a crew member is crossing the boundary between the work zone and vehicle traffic. This process shall also be responsible for issuing an alert to the crew member that is crossing the work zone boundary. The process shall accept input from work zone intrusion detection devices and issue alerts to crew based upon knowledge of the intrusion and where the crew is located.

Functional Requirements: None.

### **9.3.1.4 Monitor Crew Movement On-Board**

Overview: This process shall monitor the crew movements to identify when a crew member is crossing the boundary between a work zone and vehicle traffic. This process shall also be responsible for issuing an alert to the crew member that is crossing the work zone boundary. This process shall identify the location of crew members and place this location within a map based representation of the work zone. This map based monitoring shall be provided to the maintenance field personnel in the maintenance vehicle. The process shall accept input from work zone intrusion detection devices and issue alerts to crew or to other maintenance vehicles based upon knowledge of the intrusion and where the crew is located. The process shall send information on crew movements to other maintenance vehicles.

Functional Requirements: None.

### **9.3.2.1 Status Work Zone Activity**

Overview: This process shall create a view of work zone activity through inputs from field personnel and from work zone devices on-board the maintenance and construction vehicle. Field personnel inputs could include the status of maintenance or construction work, field personnel, equipment, or materials. The process shall collect inputs from work zone devices on board the maintenance and construction vehicle that monitor intrusion detection, intrusion alert, or crew movement and format these for transmission to other maintenance and construction management processes.

Functional Requirements: None.

### **9.3.2.2 Collect Work Zone Data**

Overview: This process shall be responsible for collecting work zone data from a variety of sources in order to develop an overall view of the work zone status that can be output to center personnel, forwarded to other processes for archival, or prepared for distribution to agencies beyond the maintenance and construction management facility collecting the data. The process shall collect both work zone activity plans and work zone status. The work zone data collected shall include video images from cameras located in or near the work zone. The work zone data collected shall also include inputs from field personnel, and inputs from work zone monitoring devices (such as intrusion detection or alert devices and speed monitoring devices) on-board the vehicle and at the roadside. The process shall collect work zone data from other maintenance and construction management entities. The process shall forward status of work zone activity collected from other maintenance and construction management entities to M&C Center Personnel.

Functional Requirements: None.

### **9.3.2.3 Generate Work Zone Information for Distribution**

Overview: This process shall process and format the work zone data into information suitable for distribution to terminators and other processes outside the maintenance and construction management function, as directed by the M&C center personnel. These include the media and other maintenance and construction management as well as processes in Manage Traffic, Manage Transit, Manage Emergency Services, and Provide Driver and Traveler Services. The process shall send work zone video images to traffic management, media, and other maintenance and construction management. Information shall also be sent to other processes for output to drivers via roadside information equipment such as dynamic message signs.

Functional Requirements: None.

### **9.3.2.4 Provide M&C Field Personnel Interface for Work Zones**

Overview: This process shall provide an interface for M&C Field Personnel to input status of their work zone activities. This work zone status input shall include the status of maintenance or construction work, field personnel, equipment, or materials. The process shall also be responsible for providing status information to the M&C Field Personnel on devices operated or monitored from on-board the maintenance and construction vehicle. The process shall accept control inputs for those devices operated from on-board the maintenance and construction vehicle. The process shall receive status of other work zone activity for presentation to the M&C Field Personnel.

Functional Requirements: None.

### **9.3.3.1 Collect Vehicle Speed**

Overview: This process shall be responsible for collecting the speed of individual vehicles as they enter or pass through a work zone. The process shall provide data and device status to the process or terminator controlling the speed monitoring device. The process shall pass the speed measurement onto other roadside devices for display to drivers, or provide individual speed information to another process for speed enforcement. The process shall aggregate speed data to provide periodic logs of the vehicle speed.

Functional Requirements: None.

### **9.3.3.2 Monitor Vehicle Speed in Work Zone**

Overview: This process shall be responsible for monitoring the speeds of vehicles traveling in a work zone. The process shall receive inputs from devices that monitor the speed of individual vehicles as well as from devices that monitor the speed of the flow of traffic. The process shall be responsible for the control of the devices that monitor individual vehicle speed. The process shall receive an input from environmental sensors at the roadway. The process shall assess, using the environmental conditions as an input, whether speed in the work zone exceeds the speed limit, or is excessive given the environmental conditions. The process shall be capable of notifying the Enforcement Agency when vehicle speeds in the work zone are in excess of the posted speed limit or are creating an unsafe condition based upon the current environmental conditions. The process shall receive an input from the speed enforcement process indicating speed violations that have been identified.

Functional Requirements: None.

### **9.3.3.3 Monitor Vehicle Speed on Roadway**

Overview: This process shall be responsible for monitoring the speeds of vehicles traveling in or approaching a work zone. The process shall receive inputs from devices that monitor the speed of individual vehicles as well as from devices that monitor the speed of the flow of traffic. The process shall be responsible for the control of the devices that monitor individual vehicle speed. The process shall receive an input from environmental sensors at the roadway. The process shall assess, using the environmental conditions as an input, whether speed in the work zone exceeds the speed limit, or is excessive given the environmental conditions. The process shall be capable of notifying the Enforcement Agency when vehicle speeds in the work zone are in excess of the posted speed limit or are creating an unsafe condition based upon the current environmental conditions. The process shall receive an input from the speed enforcement process indicating speed violations that have been identified.

Functional Requirements: None.

### **9.3.3.4 Support Vehicle Speed Enforcement**

Overview: This process shall be responsible for obtaining the information needed to enforce vehicle speed limits in a work zone. The process shall associate a vehicle identification with the individual vehicle speed measured in excess of posted speed limits. The process shall provide the information on a specific vehicle that exceeds the speed limit to the Enforcement Agency. The process shall have the capability of including current environmental conditions, as measured by local environmental sensors, in its assessment of whether the vehicle speed exceeds a safe operating speed. The process shall provide information regarding speed violations to speed monitoring processes in the Manage Maintenance and Construction function. The process shall accept device control or parameter inputs from the Enforcement Agency.

Functional Requirements: None.

#### **9.3.4.1 Detect Work Zone Intrusion**

Overview: This process shall be responsible for detecting that a vehicle has intruded upon the boundary of a work zone. The process shall output an intrusion detection indication to other processes that provide intrusion alerts. The process shall accept inputs to control the intrusion detection device. The process shall output intrusion detection for monitoring by M&C Center Personnel.

Functional Requirements: None.

#### **9.3.4.2 Provide Work Zone Intrusion Alert**

Overview: This process shall be responsible for alerting drivers that they have intruded upon the perimeter of the work zone, or are about to do so. The process shall provide alerts directly to drivers or shall send the alert to another process that provides in-vehicle signing. The process shall be responsible for alerting the Field Personnel of an actual or impending intrusion in the work zone. The alerts shall be generated when an intrusion detection indication is received from another process. The process shall accept inputs to control the intrusion alert devices.

Functional Requirements: None.

#### **9.3.4.3 Detect Work Zone Intrusion On-Board**

Overview: This process shall be responsible for detecting on-board a maintenance and construction vehicle that a vehicle has intruded upon the boundary of a work zone. For this process the boundary of the work zone represents an area around the maintenance and construction vehicle, which may be stationary or moving. The process shall accept inputs to control the intrusion detection device.

Functional Requirements: None.

#### **9.3.4.4 Provide On-Board Work Zone Intrusion Alert**

Overview: This process shall be responsible for alerting drivers that they have intruded upon the perimeter of the work zone as represented by an area surrounding a maintenance and construction vehicle, or are about to do so. The process shall provide alerts directly to drivers or shall send the alert to another process that provides in-vehicle signing. The process shall be responsible for alerting the Field Personnel of an actual or impending intrusion in the work zone. The alerts shall be generated when an intrusion detection indication is received from another process. The process shall accept inputs to control the intrusion alert devices.

Functional Requirements: None.



#### **9.4.2 Collect Environmental Data**

Overview: This process is responsible for gathering environmental and road condition data from sensors, weather sources, and other ITS centers to support the Manage Maintenance and Construction function. The data gathered by this process shall include the outputs of environmental and road condition sensors located at the roadway or on maintenance and construction vehicles, or from ITS centers whose vehicles are equipped as environmental probes (such as transit, emergency, or personal vehicles). Data gathered by this process shall include data collected from weather sources, including both the weather service and transportation weather service providers. Data gathered by this process shall include data collected from other ITS centers, such as other maintenance and construction management centers and traffic management centers. The process shall be capable of controlling environmental sensors at the roadway or on maintenance and construction vehicles. The process shall send the environmental and road condition data to other Manage Maintenance and Construction processes for display, processing, analysis, storage, and for use in anticipating needed roadway maintenance and treatment activities. The process shall collect and send environmental sensor fault information to other processes for equipment repair, if needed.

Functional Requirements: None.

#### **9.4.3 Process Environmental Data**

Overview: This process shall receive data from the Collect Environmental Data function and shall filter, fuse, and process the many types of environmental data that are collected, as prescribed using parameters from the M&C Center Personnel. This process shall also receive road weather information from other maintenance and construction management systems. The process shall perform quality control on the data received and develop source reliability information. The process shall use the various data inputs to develop a view of current and predicted road weather and road conditions. This processed environmental information shall be forwarded to another process for dissemination to other agencies. The information shall be provided to the weather service and the surface transportation weather service. The information shall be provided to other Manage Maintenance and Construction processes for use in determining treatment needs, for providing decision support, and for scheduling maintenance and construction activities.

Functional Requirements: None.

#### **9.4.4 Disseminate Environmental Information**

Overview: This process shall be responsible for disseminating environmental and road weather information to other functions, including Manage Traffic, Manage Transit, Manage Emergency Services, and Provide Driver and Traveler Services. The process shall disseminate current and forecasted road weather and road condition information. The process shall filter, aggregate and/or format the information received from the Process Environmental Data and Collect Environmental Data processes so that the information is appropriate for distribution external to the Manage Maintenance and Construction function. This environmental information is based on data collected from maintenance vehicle onboard sensors, roadside sensors, sensors owned by other agencies, and data from weather service and surface transportation weather service sources.

Functional Requirements: None.

#### **9.4.5 Provide M&C Center Personnel Interface for Environment**

Overview: This process shall present environmental and road weather information to the M&C Center Personnel based on processing parameters input by that operator. This represents the operator display for the environmental and road weather information that is collected, processed, and disseminated by the Manage Maintenance and Construction function. The information is based on data collected via maintenance vehicle onboard sensors, roadside sensors, vehicle probe data from other ITS centers (transit, emergency, personal vehicles), and weather service providers.

Functional Requirements: None.

**APPENDIX B**  
**RELEVANT ARCHITECTURE FLOW DEFINITIONS**

**AHS control information**

Control data to AHS roadway equipment.

**archive analysis requests**

A user request that initiates data mining, analytical processing, aggregation or summarization, report formulation, or other advanced processing and analysis of archived data. The request also includes information that is used to identify and authenticate the user and support electronic payment requirements, if any.

**archive analysis results**

Processed information products, supporting meta data, and any associated transaction information resulting from data mining, analytical processing, aggregation or summarization, report formulation, or other on-line processing and analysis of archived data.

**archive management data**

Information used to support the management of an ITS archive including database reports on the condition and quality of the archived data, status of the import and collection process, reports that monitor archive usage, and any special requests that require direct action by the administrator (e.g., requests for access to new data sources).

**archive management requests**

Commands, requests, and queries that support the administration and management of an ITS data archive.

**archive request confirmation**

Confirmation that an archive request has been received and processed with information on the disposition of the request.

**archive requests**

A request to a data source for information on available data (i.e. "catalog") or a request that defines the data to be archived. The request can be a general subscription intended to initiate a continuous or regular data stream or a specific request intended to initiate a one-time response from the recipient.

**archive status**

Notification that data provided to an archive contains erroneous, missing, or suspicious data or verification that the data provided appears valid. If an error has been detected, the offending data and the nature of the potential problem are identified.

**archived data product requests**

A user-specified request for archived data products (i.e. data, meta data, or data catalogs). The request also includes information that is used to identify and authenticate the user and support electronic payment requirements, if any.

### **archived data products**

Raw or processed data, meta data, data catalogs and other data products provided to a user system upon request. The response may also include any associated transaction information.

### **arriving train information**

Information for a train approaching a highway-rail intersection that may include direction and allow calculation of approximate arrival time and closure duration.

### **asset archive data**

Information describing transportation assets including pavements, bridges, and all other infrastructure included in the transportation network. In addition, information can cover support assets (support equipment and systems, software, etc.). Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.

### **asset inventory**

Information on pavement, bridges, signs and other assets. This includes asset location, installation information, materials information, vendor/contractor information, current maintenance status, and a variety of other information (e.g., video logs) that define the transportation infrastructure.

### **asset restrictions**

Restrictions levied on transportation asset usage based on infrastructure design, surveys, tests, or analyses. This includes standard height, width, and weight restrictions by facility as well as special restrictions such as spring weight restrictions and temporary bridge weight restrictions.

### **asset status update**

Changes to status of pavement, bridges, signs and other assets resulting from maintenance or construction activities or infrastructure monitoring. The updates may include changes in installation information, materials information, vendor/contractor information, condition, and current maintenance status. In addition to infrastructure asset updates, the information provided may also include status of the maintenance and construction support assets, including vehicle and equipment utilization and repair records.

### **bad tag list**

List of invalid transit user tags which may have previously failed a fare payment transaction.

### **basic vehicle measures**

Information provided to on-board ITS equipment from the vehicle platform indicating current vehicle status.

### **broadcast advisories**

General broadcast advisories that are provided over wide-area wireless communications direct to the vehicle radio. These analog advisory messages may provide similar content to ITS broadcast information flows, but include no digital data component. Existing Highway-Advisory Radio (HAR) advisory messages are a prime example of this flow.

**broadcast information**

General broadcast information that contains link travel times, incidents, advisories, transit services and a myriad of other traveler information.

**care facility status**

Information regarding facility type and capabilities, facility status, and its ability to admit new patients.

**care facility status request**

Request for information regarding care facility availability and status.

**credentials information**

Response containing full credentials information. "Response" may be provided in reaction to a real-time query or a standing request for updated information. The query flow is not explicitly shown.

**credentials status information**

Credentials information such as registration, licensing, insurance, check flags, and electronic screening enrollment data. A unique identifier is included. Corresponds to the credentials portion of CVISN "snapshots." The status information may be provided as a response to a real-time query or as a result of a standing request for updated information (subscription). This may also include information about non-U.S. fleets for use by U.S. authorities, and information regarding U.S. fleets made available to Mexican and Canadian authorities. The query flow is not explicitly shown.

**crew movements**

Field crew location within a work zone that is monitored to enhance work zone safety.

**crossing call**

Request for pedestrian crossing.

**crossing permission**

Signal to pedestrians indicating permission to cross roadway.

**current asset restrictions**

Restrictions levied on transportation asset usage based on infrastructure design, surveys, tests, or analyses. This includes standard facility design height, width, and weight restrictions, special restrictions such as spring weight restrictions, and temporary facility restrictions that are imposed during maintenance and construction.

**data collection and monitoring control**

Information used to configure and control data collection and monitoring systems.

**demand responsive transit plan**

Plan regarding overall demand responsive transit schedules and deployment.

**demand responsive transit request**

Request for paratransit support.

**dispatch information**

Dispatch information and command to emergency personnel.

**driver information**

General advisory and traffic control information provided to the driver while en route.

**driver instructions**

Transit service instructions, traffic information, road conditions, and other information for both transit and paratransit drivers.

**driver updates**

Information displayed or otherwise conveyed by the vehicle to the driver.

**emergency acknowledge**

Acknowledge request for emergency assistance and provide additional details regarding actions and verification requirements.

**emergency archive data**

Logged incident information that characterizes the identified incidents and provides a record of the corresponding incident response. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.

**emergency dispatch requests**

Emergency vehicle dispatch instructions including incident location and available information concerning the incident.

**emergency dispatch response**

Request for additional emergency dispatch information (e.g., a suggested route) and provision of en route status.

**emergency notification**

An emergency request for assistance originated by a traveler using an in-vehicle, public access, or personal device.

**emergency operations request**

Emergency operator inputs supporting call taking, dispatch, and other operations and communications center operator functions.

**emergency operations status**

Emergency operations data supporting a range of emergency operating positions including call taker, dispatch, and various other operations and communications center operator positions.

**emergency personnel inputs**

Current incident status information and requests from emergency personnel in the field for information and/or resources.

**emergency traffic control request**

Special request to preempt the current traffic control strategy in effect at one or more signalized intersections or highway segments. For example, this flow can request all signals to red-flash, request a progression of traffic control preemptions along an emergency vehicle route, or request another special traffic control plan.

**emergency traffic control response**

Status of the special traffic signal control strategy implemented in response to the emergency traffic control request.

**emergency vehicle tracking data**

The current location and operating status of the emergency vehicle.



**emissions data**

Emissions data and associated imagery collected by roadside equipment.

**environmental conditions data**

Current road conditions (e.g., surface temperature, subsurface temperature, moisture, icing, treatment status) and surface weather conditions (e.g., air temperature, wind speed, precipitation, visibility) as measured and reported by environmental sensors.

**environmental probe data**

Current environmental conditions (e.g., air temperature, wind speed, surface temperature) as measured by vehicle-based environmental sensors. In addition to environmental sensor inputs, this flow may also include vehicle control system information that may indicate adverse road surface conditions (e.g., traction control system activations).

**environmental sensors control**

Data used to configure and control environmental sensors.

**equipment availability**

An inventory of the maintenance and construction equipment available at the storage facility. This flow includes the type of equipment, enough descriptive information to indicate its suitability for use, and its current status. This flow may contain information for a specific type of equipment or include all equipment available at the facility.

**equipment maintenance status**

Current status of field equipment maintenance actions.

**event confirmation**

Confirmation that special event details have been received and processed.

**event information**

Special event information for travelers. This would include a broader array of information than the similar "event plans" that conveys only information necessary to support traffic management for the event.

**event information request**

Request for special event information.

**event plans**

Plans for major events possibly impacting traffic.

**external reports**

Traffic and incident information that is collected by the media through a variety of mechanisms (e.g., radio station call-in programs, air surveillance).

**fare and payment status**

Current fare collection information including the operational status of the fare collection equipment and financial payment transaction data.

**fare and price information**

Current transit, parking, and toll fee schedule information.

**fare management information**

Transit fare information and transaction data used to manage transit fare processing on the transit vehicle.

**field device status**

Reports from field equipment (sensors, signals, signs, controllers, etc.) which indicate current operational status.

**field equipment status**

Identification of field equipment requiring repair and known information about the associated faults.

**freeway control data**

Control commands and operating parameters for ramp meters, mainline metering/lane controls and other systems associated with freeway operations.

**freeway control status**

Current operational status and operating parameters for ramp meters, mainline metering/lane controls and other control equipment associated with freeway operations.

**government reporting data receipt**

The acknowledgement of satisfactory receipt of information used as input to government data systems or a report identifying problems or issues with the data submittal.

**government reporting system data**

Information provided by an ITS archive, formatted as appropriate, that can be used as input to government data reporting systems.

**hazmat information**

Information about a particular hazmat load including nature of the load and unloading instructions. May also include hazmat vehicle route and route update information.

**hazmat information request**

Request for information about a particular hazmat load.

**hri advisories**

Notification of Highway-Rail Intersection equipment failure, intersection blockage, or other condition requiring attention, and maintenance activities at or near highway rail intersections.

**hri control data**

Data required for HRI information transmitted at railroad grade crossings and within railroad operations.

**hri operational status**

Status of the highway-rail grade crossing equipment including both the current state or mode of operation and the current equipment condition.

**hri request**

A request for highway-rail intersection status or a specific control request intended to modify HRI operation.

**hri status**

Status of the highway-rail intersection equipment including both the current state or mode of operation and the current equipment condition.

**incident command information**

Information that supports local management of an incident. It includes resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response.

**incident command information presentation**

Presentation of information to emergency personnel in the field that supports local tactical decision-making within an incident command system structure.

**incident command request**

Request for resources, commands for relay to other allied response agencies, and other requests that reflect local command of an evolving incident response.

**incident information**

Notification of existence of incident and expected severity, location, time and nature of incident.

**incident information for media**

Report of current desensitized incident information prepared for public dissemination through the media.

**incident information request**

Request for incident information, clearing time, severity. The request can be a subscription that initiates as-needed information updates as well as a one-time request for information.

**incident notification**

The notification of an incident including its nature, severity, and location.

**incident notification response**

Interactive acknowledgement and verification of the incident information received, requests for additional information, and general information on incident response status.

**incident report**

Report of an identified incident including incident location, type, severity and other information necessary to initiate an appropriate incident response.

### **incident response coordination**

Incident response procedures, resource coordination, and current incident response status that are shared between allied response agencies to support a coordinated response to incidents. This flow also coordinates a positive hand off of responsibility for all or part of an incident response between agencies.

### **incident response status**

Status of the current incident response including traffic management strategies implemented at the site (e.g., closures, diversions, traffic signal control overrides).

### **incident status**

Information gathered at the incident site that more completely characterizes the incident and provides current incident response status.

### **infrastructure conditions data**

Current condition of pavement, bridges, culverts, signs, and other roadway infrastructure as measured by on-board sensors or read from infrastructure-based sensors. The data may include raw data or images (e.g., photo logs) that indicate the current status of the infrastructure.

### **infrastructure monitoring sensor control**

Data used to configure and control infrastructure monitoring sensors.

### **infrastructure monitoring sensor data**

Data read from infrastructure-based sensors that monitor the condition of pavement, bridges, culverts, signs, and other roadway infrastructure.

### **intersection blockage notification**

Notification that a highway-rail intersection is obstructed and supporting information.

### **intersection status**

Status of intersection congestion, approaching vehicles, etc.

### **in-vehicle transaction status**

The status of an electronic payment transaction presented to the driver by in-vehicle equipment.

### **ISP coordination**

Coordination and exchange of transportation information between centers. This flow allows a broad range of transportation information collected by one ISP to be redistributed to many other ISPs and their clients.

### **ISP operating parameter updates**

Tuning and performance enhancement parameters to ISP algorithms.

### **ISP operating parameters**

Parameters provided to the ISP Operator by the ISP including broadcast information settings, route selection controls, and travel optimization algorithms.

### **license request**

Request supporting registration data based on license plate read during violation.

### **logged special vehicle route**

Anticipated route information for special vehicles (e.g., oversized vehicles) or groups of vehicles (e.g., governor's motorcade) that may require changes in traffic control strategy.

### **maint and constr administrative information**

Administrative information that is provided to support maintenance and construction operations. This information includes: equipment and consumables resupply purchase request status, personnel qualifications including training and special certifications, environmental regulations and rules that may impact maintenance activities, and requests and project requirements from contract administration.

### **maint and constr administrative request**

Requests for maintenance and construction administrative information or services. Requests include: requests to purchasing for equipment and consumables resupply and requests to human resources that manage training and special certification for field crews and other personnel.

### **maint and constr archive data**

Information describing road construction and maintenance activities identifying the type of activity, the work performed, and work zone information including work zone configuration and safety (e.g., a record of intrusions and vehicle speeds) information. For construction activities, this information also includes a description of the completed infrastructure, including as-built plans as applicable. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.

### **maint and constr center personnel inputs**

Maintenance and construction related information (e.g., routing information, scheduling data, dispatch instructions, resource allocations, incident coordination) entered by maintenance and construction center personnel.

**maint and constr dispatch information**

Information used to dispatch maintenance and construction vehicles, equipment, and crews. This information includes routing information, traffic information, road restrictions, incident information, environmental information, decision support information, maintenance schedule data, dispatch instructions, personnel assignments, and corrective actions.

**maint and constr dispatch status**

Current maintenance and construction status including work data, operator status, crew status, and equipment status.

**maint and constr equipment repair status**

Current maintenance and repair status of the maintenance and construction vehicle fleet and other support equipment. This information includes a record of all maintenance and repair activities performed.

**maint and constr field personnel information presentation**

Information presented to maintenance and construction field personnel including vehicle routing and traffic information, road restrictions, environmental information, decision support information, maintenance schedules, dispatch instructions, maintenance personnel assignments, vehicle maintenance information, work zone status information, and corrective actions.

**maint and constr field personnel inputs**

Current maintenance and construction status information provided by field personnel including work data, operator status, crew status, vehicle status, and equipment status.

**maint and constr fleet information**

Information supporting maintenance of the maintenance and construction vehicle fleet and other support equipment. This information includes vehicle status and diagnostic information, vehicle utilization, and coordination of when vehicles will be available for preventative and corrective maintenance.

**maint and constr material information**

Information on materials stored on the vehicle including quantity and current application rate.

**maint and constr operations information presentation**

Presentation of maintenance and construction operations information to center personnel. This information includes maintenance resource status (vehicles, equipment, and personnel), work schedule information, work status, road and weather conditions, traffic information, incident information and associated resource requests, and a range of other information that supports efficient maintenance and construction operations and planning.

**maint and constr resource request**

Request for road maintenance and construction resources that can be used in the diversion of traffic (cones, portable signs), clearance of a road hazard, repair of ancillary damage, or any other incident response.

**maint and constr resource response**

Current status of maintenance and construction resources including availability and deployment status.

**maint and constr vehicle condition presentation**

Presentation of vehicle diagnostics and operating status including speed, engine temperature, mileage, tire wear, brake wear, belt wear, maintenance and construction system status, environmental sensor information, and other measures associated with the operation of a maintenance vehicle.

**maint and constr vehicle conditions**

Vehicle diagnostics information that is collected, filtered, and selectively reported by a maintenance and construction vehicle. The information includes engine temperature, mileage, tire wear, brake wear, belt wear, and any warnings or alarms concerning the operational condition of the vehicle and ancillary equipment.

**maint and constr vehicle control**

Control data sent from on-board ITS systems to control maintenance and construction vehicle equipment, including control of materials dispersion rate and other control functions that will vary with vehicle type and application.

**maint and constr vehicle location data**

The current location and related status (e.g., direction and speed) of the maintenance/construction vehicle.

**maint and constr vehicle measures**

Raw vehicle diagnostics and operating status data reported by the maintenance vehicle platform including engine temperature, mileage, tire wear, brake wear, belt wear, and other operational status measures. In addition to this general vehicle status, this flow also includes the status of maintenance and construction-specific systems on the vehicle.

**maint and constr vehicle operational data**

Data that describes the maintenance and construction activity performed by the vehicle. Operational data includes materials usage (amount stored and current application rate), operational state of the maintenance equipment (e.g., blade up/down, spreader pattern), vehicle safety status, and other measures associated with the operation of a maintenance, construction, or other special purpose vehicle. Operational data may include basic operational status of the vehicle equipment or a more precise record of the work performed (e.g., application of crack sealant with precise locations and application characteristics).

**maint and constr vehicle system control**

Configure and control data that supports remote control of on-board maintenance and construction vehicle systems and field equipment that is remotely controlled by the vehicle. For example, the data can be used to adjust material application rates and spread patterns.



**maint and constr work performance**

Overall project status and work performance information provided to support contract administration.

**maint and constr work plans**

Future construction and maintenance work schedules and activities including anticipated closures with anticipated impact to the roadway, alternate routes, anticipated delays, closure times, and durations.

**maintenance and repair needs**

Recommended strategies and schedules for maintenance of the transportation infrastructure.

**maintenance materials storage status**

The amount and availability of maintenance materials in storage facilities.

**maintenance status**

Current maintenance status of vehicle.

**map update request**

Request for a map update which could include a new underlying map or map layer updates.

**map updates**

Map update which could include a new underlying static or real-time map or map layer(s) update.

**media information request**

Request from the media for current transportation information.

**multimodal information**

Schedule information for alternate mode transportation providers such as train, ferry, air and bus.

**multimodal information request**

Information request for alternate mode transportation providers such as train, ferry, air and bus.

**multimodal service data**

Multimodal transportation schedules and other service information.

**payment**

Payment of some kind (e.g., toll, parking, fare) by traveler which, in most cases, can be related to a credit account.

**payment request**

Request for payment from financial institution.

**payment violation notification**

Notification to enforcement agency of a toll, parking, or transit fare payment violation.

**personal transit information**

General and personalized transit information for a particular fixed route, flexible route, or paratransit system.

**position fix**

Information which provides a traveler's or vehicle's geographical position.

**provider profile confirm**

Confirmation of profile information received by a service provider (e.g. for a hotel or restaurant).

**provider profile data**

Information supplied by a service provider (e.g., a hotel or restaurant) that identifies the service provider and provides details of the service offering. This flow covers initial registration of a service provider and subsequent submittal of new information and status updates so that data currency is maintained.

**railroad advisories**

Real-time notification of railway-related incident or advisory.

**railroad schedules**

Train schedules, maintenance schedules, and other information from the railroad that supports forecast of HRI closures.

**registration**

Registered owner of vehicle and associated vehicle information.

**remote surveillance control**

The control commands used to remotely operate another center's sensors or surveillance equipment so that roadside surveillance assets can be shared by more than one agency.

**request fare and price information**

Requests for current fare and price information from a service provider that can be used to augment the traffic manager's overall view of current transportation network status.

**request for bad tag list**

Request for list of bad vehicle tag IDs.

**request for enforcement**

Request for traffic enforcement to address safety issues in a work zone or other special situations.

**request for payment**

Request to deduct cost of service from user's payment account.

**request for right-of-way**

Forwarded request from signal prioritization, signal preemption, pedestrian call, multi-modal crossing activation, or other source for right-of-way.

**request for road network conditions**

Request for traffic information, road conditions, surface weather conditions, incident information, and other road network status. The request specifies the region/route of interest, the desired effective time period, and other parameters that allow preparation of a tailored response. The request can be a subscription that initiates as-needed information updates as well as a one-time request for information.

**request for vehicle measures**

Request for vehicle performance and maintenance data collected by onboard sensors.

**request tag data**

Request for tag information including credit identity, stored value card cash, etc.

**request transit information**

Request for transit service information and current transit status.

**resource deployment status**

Status of traffic management center resource deployment identifying the resources available and their current deployment status.

**resource request**

A request for traffic management resources to implement special traffic control measures, assist in clean up, verify an incident, etc.

**reversible lane status**

Current reversible lane status including traffic sensor and surveillance data and the operational status and mode of the reversible lane control equipment.

**road data**

Basic road facility and treatment information that supports road conditions forecasts.

**road network conditions**

Current and forecasted traffic information, road and weather conditions, incident information, and other road network status. Either raw data, processed data, or some combination of both may be provided by this architecture flow.

**road network probe information**

Aggregated route usage, travel times, environmental conditions, and other aggregated data collected from probe vehicles.

**road weather information**

Road conditions and weather information that are made available by road maintenance operations to other transportation system operators.

**roadside archive data**

A broad set of data derived from roadside sensors that includes current traffic conditions, environmental conditions, and any other data that can be directly collected by roadside sensors. This data also indicates the status of the sensors and reports of any identified sensor faults.

**roadside transaction status**

The status of an electronic payment transaction provided directly to the driver via sign or other roadside infrastructure.

**roadway equipment coordination**

The direct flow of information between field equipment. This includes transfer of information between sensors and driver information systems or control devices (traffic signals, ramp meters, etc.), direct coordination between adjacent control devices, interfaces between detection and warning or alarm systems, and any other direct communications between field equipment. Both peer-to-peer and master-slave communications between field devices are covered by this flow.

**roadway information system data**

Information used to initialize, configure, and control roadside systems that provide driver information (e.g., dynamic message signs, highway advisory radio, beacon systems). This flow can provide message content and delivery attributes, local message store maintenance requests, control mode commands, status queries, and all other commands and associated parameters that support remote management of these systems.

**roadway information system status**

Current operating status of dynamic message signs, highway advisory radios, beacon systems, or other configurable field equipment that provides dynamic information to the driver.

**roadway maintenance status**

Summary of maintenance fleet operations affecting the road network. This includes the status of winter maintenance (snow plow schedule and current status).

**route assignment**

Route assignment information for transit driver.

### **safety status information**

Safety information such as safety ratings, inspection summaries, and violation summaries. A unique identifier is included. Corresponds to the safety portion of CVISN "snapshots." The status information may be provided as a response to a real-time query or as a result of a standing request for updated information (subscription). This may also include information about non-U.S. fleets for use by U.S. authorities, and information regarding U.S. fleets made available to Mexican and Canadian authorities. The query flow is not explicitly shown.

### **secure area characteristics**

Characteristics (visual, audible, other) that are monitored by surveillance security systems via sensors.

### **selected routes**

Routes selected based on route request criteria.

### **signal control data**

Information used to configure and control traffic signal systems.

### **signal control status**

Status of surface street signal controls.

### **speed monitoring control**

Information used to configure and control automated speed monitoring, speed warning, and speed enforcement systems.

### **speed monitoring information**

System status including current operational state and logged information including measured speeds, warning messages displayed, and violation records.

### **storage facility request**

Request for information about the equipment and/or materials available at a maintenance storage facility.

### **suggested route**

Suggested route for a dispatched emergency or maintenance vehicle that may reflect current network conditions and the additional routing options available to en route emergency or maintenance vehicles that are not available to the general public.

**tag data**

Unique tag ID and related vehicle information.

**tag update**

Update data held in tag which can be read by another roadside device (Commercial Vehicle Check Subsystem, Toll Collection Subsystem, etc.).

**toll administration requests**

Instructions indicating toll fees which should be charged.

**toll archive data**

Data indicating toll facility usage and pricing schedules. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.

**toll data**

Current toll schedules for different types of vehicles as well as advanced toll payment information.

**toll data request**

Request made to obtain toll schedule information or pay a toll in advance. The request can be a subscription that initiates as-needed information updates as well as a one-time request for information.

**toll demand management request**

Request to change the demand for toll road facility use through pricing or other mechanisms.

**toll demand management response**

Response to toll demand management change requests indicating level of compliance with request.

**toll instructions**

Demand management toll pricing information based on current congestion.

**toll operator requests**

Request for information from toll operator at toll collection site.

**toll revenues and summary reports**

Summary of toll revenues and toll-related reports to toll service provider.

**toll transaction reports**

Summary report sent to toll collection point operator containing previous toll transactions.

**toll transactions**

Detailed list of transactions from a toll station.

**track status**

Current status of the wayside equipment and notification of an arriving train.

**traffic archive data**

Information describing the use and vehicle composition on transportation facilities and the traffic control strategies employed. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.

**traffic characteristics**

Physical traffic characteristics which are monitored and translated into macroscopic measures like occupancy, volume, density, and average speed. Point measures support presence detection and individual vehicle measures like speed.

**traffic control coordination**

Information transfers that enable remote monitoring and control of traffic management devices. This flow is intended to allow cooperative access to, and control of, field equipment during incidents and special events and during day-to-day operations. This flow also allows 24-hour centers to monitor and control assets of other centers during off-hours, allows system redundancies and fail-over capabilities to be established, and otherwise enables integrated traffic control strategies in a region.

**traffic control priority request**

Request for signal priority at one or more intersections along a particular route.



**traffic control priority status**

Status of signal priority request functions at the roadside (e.g. enabled or disabled).

**traffic flow**

Raw and/or processed traffic detector data which allows derivation of traffic flow variables (e.g., speed, volume, and density measures) and associated information (e.g., congestion, potential incidents).

**traffic images**

High fidelity, real-time traffic images suitable for surveillance monitoring by the operator or for use in machine vision applications. This flow includes the images and the operational status of the surveillance system.

**traffic information coordination**

Traffic information exchanged between TMC's. Normally would include incidents, congestion data, traffic data, signal timing plans, and real-time signal control information.

**traffic operator data**

Presentation of traffic operations data to the operator including traffic conditions, current operating status of traffic control equipment, maintenance activity status, incident status, and other information. This data keeps the operator apprised of current road network status, provides feedback to the operator as traffic control actions are implemented, and supports review of historical data and preparation for future traffic operations activities.

**traffic operator inputs**

Traffic operations requests for information, configuration changes, commands to adjust current traffic control strategies (e.g., adjust signal timing plans, change DMS messages), and other traffic operations data entry.

**traffic sensor control**

Information used to configure and control traffic sensor systems.

**traffic violation notification**

Notification to enforcement agency of a detected traffic violation including speed violations, HOV passenger occupancy violations, and vehicle emissions violations.

**transaction status**

Response to transaction request. Normally dealing with a request for payment.

**transit and fare schedules**

Specific transit and fare schedule information including schedule adherence.

**transit archive data**

Data used to describe and monitor transit demand, fares, operations, and system performance. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.

**transit demand management request**

Request to change the demand for transit facility use through pricing or other mechanisms.

**transit demand management response**

Response to transit demand management change requests indicating level of compliance with request.

**transit driver availability**

Transit driver availability data that can be used to develop driver assignments and detailed operations schedules.

**transit driver display**

Display (either video or audio) to transit driver containing status of various ITS services.

**transit driver inputs**

Transit driver emergency request as well as fare transaction data.

**transit emergency coordination data**

Data exchanged between centers dealing with a transit-related incident.

**transit emergency data**

Initial notification of transit emergency at a transit stop or on transit vehicles and further coordination as additional details become available and the response is coordinated.

**transit fleet manager inputs**

Instructions governing service availability, schedules, emergency response plans, transit personnel assignments, transit maintenance requirements, and other inputs that establish general system operating requirements and procedures.

**transit incident information**

Information on transit incidents that impact transit services for public dissemination.

**transit incidents for media**

Report of an incident impacting transit operations for public dissemination through the media.

**transit information for media**

Report of transit schedule deviations for public dissemination through the media.

**transit information request**

Request for transit operations information including schedule and fare information. The request can be a subscription that initiates as-needed information updates as well as a one-time request for information.

**transit information user request**

Request for special transit routing, real-time schedule information, and availability information.

**transit multimodal information**

Transit schedule information for coordination at modal interchange points.

**transit operations planning data**

Accumulated schedule and fare information, emergency response plans, transit personnel information, maintenance records, and other information intended to support overall planning and management of a transit property.

**transit operator display**

Display for transit operations personnel regarding performance of the transit fleet, current ridership and on-time performance.

**transit operator management data**

Information and control provided by transit system operators involving many aspects of managing transit operations.

**transit request confirmation**

Confirmation of a request for transit information or service.

**transit schedule information**

Current and projected transit schedule adherence.

**transit system data**

Current transit system operations information indicating current transit routes, the level of service on each route, and the progress of individual vehicles along their routes for use in forecasting demand and estimating current transportation network performance.

**transit traveler information**

Transit information prepared to support transit users and other travelers. It contains transit schedules, real-time arrival information, fare schedules, and general transit service information.

**transit traveler request**

Request by a Transit traveler to summon assistance, request transit information, or request any other transit services.

**transit user fare status**

Status of fare transaction for transit user.

**transit user inputs**

Requests from transit user through either an on-board or fixed location traveler information station.

**transit user outputs**

Information for traveler from either an on-board or fixed location traveler information station.

**transit vehicle conditions**

Operating conditions of transit vehicle (e.g., mileage).

**transit vehicle location data**

Current transit vehicle location and related operational conditions data provided by a transit vehicle.

**transit vehicle measures**

Transit vehicle status measured by on-board ITS equipment.

**transit vehicle passenger and use data**

Data collected on board the transit vehicle pertaining to availability and/or passenger count.

**transit vehicle schedule performance**

Estimated times of arrival and anticipated schedule deviations reported by a transit vehicle.

**transit work schedule**

Orders for maintenance of transit vehicle or other transit system equipment.

**transportation weather information**

Current and forecast road conditions and weather information (e.g., surface condition, flooding, wind advisories, visibility, etc.) associated with the transportation network. This information is of a resolution, timeliness, and accuracy to be useful in transportation decision making.

**transportation weather information request**

A request for transportation weather information that may specify the area of interest (a geographic region, particular routes within a region, specific road segments), the type of information that is required, the desired spatial resolution of the information, and time horizon.

**travel service info**

Reservation information or yellow pages data.

**travel service request**

Request for reservation or other service (e.g., yellow pages).

**traveler archive data**

Data associated with traveler information services including service requests, facility usage, rideshare, routing, and traveler payment transaction data. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.

**traveler information**

Traveler information comprised of traffic status, advisories, incidents, payment information and many other travel-related data updates and confirmations.

**traveler information for media**

General traveler information regarding incidents, unusual traffic conditions, transit issues, or other advisory information that has been desensitized and provided to the media.

**traveler inputs**

Request by a traveler to summon assistance, request travel information, make a reservation, or request any other traveler service.

**traveler interface updates**

Visual or audio information (e.g., routes, messages, guidance) to the traveler.

**traveler profile**

Information about a traveler including equipment capabilities, personal preferences and recurring trip characteristics.

**traveler request**

Request by a traveler to summon assistance, request information, make a reservation, or initiate any other traveler service.

**trip confirmation**

Acknowledgement by the driver/traveler of acceptance of a route.

**trip plan**

A sequence of links and special instructions comprising of a trip plan indicating efficient routes for navigating the links. Normally coordinated with traffic conditions, other incidents, preemption and prioritization plans.

**trip request**

Request by a driver/traveler for special routing.

**vehicle characteristics**

The physical or visible characteristics of an individual vehicle that can be measured to classify a vehicle and imaged to uniquely identify a vehicle.

**vehicle location**

Location of vehicle and other vehicle characteristics which are exchanged between vehicle subsystems.

**vehicle probe data**

Vehicle probe data indicating identity, route segment identity, link time and location.

**vehicle signage data**

In-vehicle signage data generated by the roadway infrastructure indicating either road conditions, street names, or special information.

**video surveillance control**

Information used to configure and control video surveillance systems.

**weather information**

Accumulated forecasted and current weather data (e.g., temperature, pressure, wind speed, wind direction, humidity, precipitation, visibility, light conditions, etc.).

**work plan feedback**

Comments and suggested changes to proposed construction and maintenance work schedules and activities. This information influences work plan schedules so that they minimize impact to other system operations and the overall transportation system.

**work zone information**

Summary of maintenance and construction work zone activities affecting the road network including the nature of the maintenance or construction activity, location, impact to the roadway, expected time(s) and duration of impact, anticipated delays, alternate routes, and suggested speed limits. This information may be augmented with images that provide a visual indication of current work zone status and traffic impacts.

**work zone status**

Current work zone status including current location (and future locations for moving work zones), impact to the roadway, required lane shifts, expected time(s) and duration of impact, anticipated delays, alternate routes, and suggested speed limits.

**work zone warning**

Warning of a work zone emergency or safety issue such as the intrusion of a vehicle into the work zone area or movement of field crew into the travel lanes.

**work zone warning device control**

Data used to configure and control work zone safety monitoring and warning devices.

**work zone warning status**

Status of a work zone safety monitoring and warning devices. This flow documents system activations and includes additional supporting information (e.g., an image) that allows verification of the alarm.

**yellow pages information**

Travel service information covering tourist attractions, lodging, restaurants, service stations, emergency services, and other services and businesses of interest to the traveler.

**yellow pages request**

Request for information through a yellow pages type service.



**APPENDIX C**  
**ASSOCIATED STANDARDS FOR ARCHITECTURE FLOWS**

**Architecture Flow**

AHS control information

Traffic Management To Roadway Subsystem

**Inventory**

HVTMC Freeway Management System

TO NYSDOT Sensors and CCTV Equipment

**Standards**

None

## Architecture Flow

archive analysis requests

Archived Data User Systems To Archived Data Management Subsystem

### **Inventory**

|  |    |  |
|--|----|--|
| Academic / Research Organizations              | TO | Bee-Line Data Management System                      |
| Academic / Research Organizations              | TO | HVTMC Incident Data Archive                          |
| Academic / Research Organizations              | TO | HVTMC Traffic Data Archive                           |
| Academic / Research Organizations              | TO | Metro North Data Management System                   |
| Academic / Research Organizations              | TO | NYSBA Toll Archive System                            |
| Academic / Research Organizations              | TO | NYSDOT Maintenance Management System                 |
| Academic / Research Organizations              | TO | NYSTA Incident Data Archive                          |
| Academic / Research Organizations              | TO | NYSTA Infrastructure Inventory and Inspection System |
| Academic / Research Organizations              | TO | NYSTA Maintenance Management System                  |
| Academic / Research Organizations              | TO | NYSTA Toll Data Storage System                       |
| Academic / Research Organizations              | TO | NYSTA Traffic Data Storage and Retrieval System      |
| HVTMC Freeway Management System Archive Access | TO | HVTMC Incident Data Archive                          |
| HVTMC Freeway Management System Archive Access | TO | HVTMC Traffic Data Archive                           |
| HVTMC Freeway Management System Archive Access | TO | NYSDOT Maintenance Management System                 |
| Transit Planners                               | TO | Bee-Line Data Management System                      |
| Transit Planners                               | TO | Metro North Data Management System                   |
| Transportation Planners                        | TO | Bee-Line Data Management System                      |
| Transportation Planners                        | TO | HVTMC Incident Data Archive                          |
| Transportation Planners                        | TO | HVTMC Traffic Data Archive                           |
| Transportation Planners                        | TO | Metro North Data Management System                   |
| Transportation Planners                        | TO | NYSBA Toll Archive System                            |
| Transportation Planners                        | TO | NYSDOT Maintenance Management System                 |
| Transportation Planners                        | TO | NYSTA Incident Data Archive                          |
| Transportation Planners                        | TO | NYSTA Infrastructure Inventory and Inspection System |
| Transportation Planners                        | TO | NYSTA Maintenance Management System                  |
| Transportation Planners                        | TO | NYSTA Toll Data Storage System                       |
| Transportation Planners                        | TO | NYSTA Traffic Data Storage and Retrieval System      |

### Standards

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

## Architecture Flow

archive analysis results

Archived Data Management Subsystem To Archived Data User Systems

### **Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Data Management System                         | TO | Academic / Research Organizations                 |
| Bee-Line Data Management System                         | TO | Transit Planners                                  |
| Bee-Line Data Management System                         | TO | Transportation Planners                           |
| HVTMC Incident Data Archive                             | TO | Academic / Research Organizations                 |
| HVTMC Incident Data Archive                             | TO | HVTMC Freeway Management System<br>Archive Access |
| HVTMC Incident Data Archive                             | TO | Transportation Planners                           |
| HVTMC Traffic Data Archive                              | TO | Academic / Research Organizations                 |
| HVTMC Traffic Data Archive                              | TO | HVTMC Freeway Management System<br>Archive Access |
| HVTMC Traffic Data Archive                              | TO | Transportation Planners                           |
| Metro North Data Management System                      | TO | Academic / Research Organizations                 |
| Metro North Data Management System                      | TO | Transit Planners                                  |
| Metro North Data Management System                      | TO | Transportation Planners                           |
| NYSBA Toll Archive System                               | TO | Academic / Research Organizations                 |
| NYSBA Toll Archive System                               | TO | Transportation Planners                           |
| NYSDOT Maintenance Management System                    | TO | Academic / Research Organizations                 |
| NYSDOT Maintenance Management System                    | TO | HVTMC Freeway Management System<br>Archive Access |
| NYSDOT Maintenance Management System                    | TO | Transportation Planners                           |
| NYSTA Incident Data Archive                             | TO | Academic / Research Organizations                 |
| NYSTA Incident Data Archive                             | TO | Transportation Planners                           |
| NYSTA Infrastructure Inventory and<br>Inspection System | TO | Academic / Research Organizations                 |
| NYSTA Infrastructure Inventory and<br>Inspection System | TO | Transportation Planners                           |
| NYSTA Maintenance Management System                     | TO | Academic / Research Organizations                 |
| NYSTA Maintenance Management System                     | TO | Transportation Planners                           |
| NYSTA Toll Data Storage System                          | TO | Academic / Research Organizations                 |
| NYSTA Toll Data Storage System                          | TO | Transportation Planners                           |
| NYSTA Traffic Data Storage and Retrieval<br>System      | TO | Academic / Research Organizations                 |
| NYSTA Traffic Data Storage and Retrieval<br>System      | TO | Transportation Planners                           |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

archive management data

Archived Data Management Subsystem To Archived Data Administrator

**Inventory**

|   |    |                           |
|---|----|---------------------------|
| HVTMC Incident Data Archive                     | TO | NYSDOT Data Administrator |
| HVTMC Traffic Data Archive                      | TO | NYSDOT Data Administrator |
| NYSBA Toll Archive System                       | TO | NYSBA Data Administrator  |
| NYSDOT Maintenance Management System            | TO | NYSDOT Data Administrator |
| NYSTA Incident Data Archive                     | TO | NYSTA Data Administrator  |
| NYSTA Toll Data Storage System                  | TO | NYSTA Data Administrator  |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Data Administrator  |

**Standards**

None

**Architecture Flow**

archive management requests

Archived Data Administrator To Archived Data Management Subsystem

**Inventory**

|                           |    |   |
|---------------------------|----|---|
| NYSBA Data Administrator  | TO | NYSBA Toll Archive System                       |
| NYSDOT Data Administrator | TO | HVTMC Incident Data Archive                     |
| NYSDOT Data Administrator | TO | HVTMC Traffic Data Archive                      |
| NYSDOT Data Administrator | TO | NYSDOT Maintenance Management System            |
| NYSTA Data Administrator  | TO | NYSTA Incident Data Archive                     |
| NYSTA Data Administrator  | TO | NYSTA Toll Data Storage System                  |
| NYSTA Data Administrator  | TO | NYSTA Traffic Data Storage and Retrieval System |

**Standards**

None

## Architecture Flow

archive request confirmation

Archived Data Management Subsystem To Archived Data User Systems

### **Inventory**

|  |    |  |
|--|----|--|
| Bee-Line Data Management System                      | TO | Academic / Research Organizations              |
| Bee-Line Data Management System                      | TO | Transit Planners                               |
| Bee-Line Data Management System                      | TO | Transportation Planners                        |
| HVTMC Incident Data Archive                          | TO | Academic / Research Organizations              |
| HVTMC Incident Data Archive                          | TO | HVTMC Freeway Management System Archive Access |
| HVTMC Incident Data Archive                          | TO | Transportation Planners                        |
| HVTMC Traffic Data Archive                           | TO | Academic / Research Organizations              |
| HVTMC Traffic Data Archive                           | TO | HVTMC Freeway Management System Archive Access |
| HVTMC Traffic Data Archive                           | TO | Transportation Planners                        |
| Metro North Data Management System                   | TO | Academic / Research Organizations              |
| Metro North Data Management System                   | TO | Transit Planners                               |
| Metro North Data Management System                   | TO | Transportation Planners                        |
| NYSBA Toll Archive System                            | TO | Academic / Research Organizations              |
| NYSBA Toll Archive System                            | TO | Transportation Planners                        |
| NYSDOT Maintenance Management System                 | TO | Academic / Research Organizations              |
| NYSDOT Maintenance Management System                 | TO | HVTMC Freeway Management System Archive Access |
| NYSDOT Maintenance Management System                 | TO | Transportation Planners                        |
| NYSTA Incident Data Archive                          | TO | Academic / Research Organizations              |
| NYSTA Incident Data Archive                          | TO | Transportation Planners                        |
| NYSTA Infrastructure Inventory and Inspection System | TO | Academic / Research Organizations              |
| NYSTA Infrastructure Inventory and Inspection System | TO | Transportation Planners                        |
| NYSTA Maintenance Management System                  | TO | Academic / Research Organizations              |
| NYSTA Maintenance Management System                  | TO | Transportation Planners                        |
| NYSTA Toll Data Storage System                       | TO | Academic / Research Organizations              |
| NYSTA Toll Data Storage System                       | TO | Transportation Planners                        |
| NYSTA Traffic Data Storage and Retrieval System      | TO | Academic / Research Organizations              |
| NYSTA Traffic Data Storage and Retrieval System      | TO | Transportation Planners                        |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

## Architecture Flow

archive requests

### Archived Data Management Subsystem To Asset Management

#### **Inventory**

|                                 |    |   |
|---------------------------------|----|---|
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive      | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive      | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive      | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive      | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive      | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive      | TO | White Plains Traffic Signal System                      |

|                            |    |   |
|----------------------------|----|---|
| HVTMC Traffic Data Archive | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive | TO | NYSDOT Street Surface Weather Condition Modeling System |



|                                    |    |   |
|------------------------------------|----|---|
| HVTMC Traffic Data Archive         | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive         | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive         | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive         | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive         | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive         | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive         | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive         | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive         | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive         | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive         | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive         | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive         | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive         | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive         | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive         | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive         | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive         | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive         | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive         | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive         | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive         | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive         | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive         | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive         | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive         | TO | White Plains Traffic Signal System                      |
| Metro North Data Management System | TO | Metro North Rail Operation Control Center               |
| Metro North Data Management System | TO | Metro North Rail Operation Control Center               |
| Metro North Data Management System | TO | Metro North Rail Operation Control Center               |
| Metro North Data Management System | TO | Metro North Rail Operation Control Center               |
| Metro North Data Management System | TO | Metro North Rail Operation Control Center               |
| Metro North Data Management System | TO | Metro North Rail Operation Control Center               |
| Metro North Data Management System | TO | Metro North Rail Operation Control Center               |
| Metro North Data Management System | TO | Metro North Rail Operation Control Center               |
| Metro North Data Management System | TO | Metro North Rail Operation Control Center               |
| Metro North Data Management System | TO | Metro North Rail Operation Control Center               |
| Metro North Data Management System | TO | Metro North Rail Operation Control Center               |
| Metro North Data Management System | TO | Metro North Rail Operation Control Center               |
| Metro North Data Management System | TO | Metro North Rail Operation Control Center               |
| NYSBA Toll Archive System          | TO | NYSBA ITS Information Service Provider                  |
| NYSBA Toll Archive System          | TO | NYSBA Maintenance and Construction                      |
| NYSBA Toll Archive System          | TO | NYSBA Operations Center                                 |
| NYSBA Toll Archive System          | TO | NYSBA Satellite Operations Centers                      |
| NYSBA Toll Archive System          | TO | NYSBA Toll Operations                                   |
| NYSBA Toll Archive System          | TO | NYSBA ITS Information Service Provider                  |
| NYSBA Toll Archive System          | TO | NYSBA Maintenance and Construction                      |
| NYSBA Toll Archive System          | TO | NYSBA Operations Center                                 |
| NYSBA Toll Archive System          | TO | NYSBA Satellite Operations Centers                      |
| NYSBA Toll Archive System          | TO | NYSBA Toll Operations                                   |

|                           |    |  |
|---------------------------|----|--|
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |



|  |    |   |
|--|----|---|
| NYSP Statewide SJS Record Management System          | TO | NYSTA Central Communications/Dispatch         |
| NYSP Statewide SJS Record Management System          | TO | NYSP Central Communication/Dispatch           |
| NYSP Statewide SJS Record Management System          | TO | NYSTA Central Communications/Dispatch         |
| NYSP Statewide SJS Record Management System          | TO | NYSP Central Communication/Dispatch           |
| NYSP Statewide SJS Record Management System          | TO | NYSTA Central Communications/Dispatch         |
| NYSP Statewide SJS Record Management System          | TO | NYSP Central Communication/Dispatch           |
| NYSP Statewide SJS Record Management System          | TO | NYSTA Central Communications/Dispatch         |
| NYSP Statewide SJS Record Management System          | TO | NYSP Central Communication/Dispatch           |
| NYSP Statewide SJS Record Management System          | TO | NYSTA Central Communications/Dispatch         |
| NYSP Statewide SJS Record Management System          | TO | NYSP Central Communication/Dispatch           |
| NYSP Statewide SJS Record Management System          | TO | NYSTA Central Communications/Dispatch         |
| NYSP Statewide SJS Record Management System          | TO | NYSP Central Communication/Dispatch           |
| NYSP Statewide SJS Record Management System          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |

|  |    |   |
|--|----|---|
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |

|  |    |  |
|--|----|--|
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System                  | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System                  | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System                  | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System                  | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System                  | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System                  | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System                  | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System                  | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System                  | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System                  | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System                  | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System                  | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System                  | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System                  | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System                  | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System                  | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System                  | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System                  | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System                  | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System                  | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System                  | TO | NYSTA Asset Management System for Maintenance          |

|                                     |    |  |
|-------------------------------------|----|--|
| NYSTA Maintenance Management System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Toll Data Storage System      | TO | NYSTA Maintenance and Construction                     |
| NYSTA Toll Data Storage System      | TO | NYSTA Statewide Operations Center                      |





|   |    |  |
|---|----|--|
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |

|   |    |  |
|---|----|--|
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

## **Architecture Flow**

archive status

### Archived Data Management Subsystem To Asset Management

#### **Inventory**

|                                 |    |   |
|---------------------------------|----|---|
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| Bee-Line Data Management System | TO | Bee-Line Bus Operations Dispatch System                 |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Incident Data Archive     | TO | HVTMC Freeway Management System                         |
| HVTMC Incident Data Archive     | TO | NYSP Central Communication/Dispatch                     |
| HVTMC Traffic Data Archive      | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive      | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive      | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive      | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive      | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive      | TO | White Plains Traffic Signal System                      |

|                            |    |   |
|----------------------------|----|---|
| HVTMC Traffic Data Archive | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Traffic Data Archive | TO | Westchester County Signal System                        |
| HVTMC Traffic Data Archive | TO | White Plains Traffic Signal System                      |
| HVTMC Traffic Data Archive | TO | HVTMC Freeway Management System                         |
| HVTMC Traffic Data Archive | TO | HVTMC ITS Information Service Provider                  |
| HVTMC Traffic Data Archive | TO | NYSDOT Maintenance and Construction                     |
| HVTMC Traffic Data Archive | TO | NYSDOT Street Surface Weather Condition Modeling System |



|                           |    |  |
|---------------------------|----|--|
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Archive System | TO | NYSBA Maintenance and Construction     |
| NYSBA Toll Archive System | TO | NYSBA Operations Center                |
| NYSBA Toll Archive System | TO | NYSBA Satellite Operations Centers     |
| NYSBA Toll Archive System | TO | NYSBA Toll Operations                  |
| NYSBA Toll Archive System | TO | NYSBA ITS Information Service Provider |



|  |    |   |
|--|----|---|
| NYSP Statewide SJS Record Management System          | TO | NYSTA Central Communications/Dispatch         |
| NYSP Statewide SJS Record Management System          | TO | NYSP Central Communication/Dispatch           |
| NYSP Statewide SJS Record Management System          | TO | NYSTA Central Communications/Dispatch         |
| NYSP Statewide SJS Record Management System          | TO | NYSP Central Communication/Dispatch           |
| NYSP Statewide SJS Record Management System          | TO | NYSTA Central Communications/Dispatch         |
| NYSP Statewide SJS Record Management System          | TO | NYSP Central Communication/Dispatch           |
| NYSP Statewide SJS Record Management System          | TO | NYSTA Central Communications/Dispatch         |
| NYSP Statewide SJS Record Management System          | TO | NYSP Central Communication/Dispatch           |
| NYSP Statewide SJS Record Management System          | TO | NYSTA Central Communications/Dispatch         |
| NYSP Statewide SJS Record Management System          | TO | NYSP Central Communication/Dispatch           |
| NYSP Statewide SJS Record Management System          | TO | NYSTA Central Communications/Dispatch         |
| NYSP Statewide SJS Record Management System          | TO | NYSP Central Communication/Dispatch           |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Incident Data Archive                          | TO | NYSTA Central Communications/Dispatch         |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |



|  |    |   |
|--|----|---|
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction            |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center             |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                 |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance |

|  |    |  |
|--|----|--|
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Infrastructure Inventory and Inspection System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System                  | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System                  | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System                  | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System                  | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System                  | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System                  | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System                  | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System                  | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System                  | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System                  | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System                  | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System                  | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System                  | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System                  | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System                  | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System                  | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System                  | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System                  | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System                  | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System                  | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System                  | TO | NYSTA Asset Management System for Maintenance          |

|                                     |    |  |
|-------------------------------------|----|--|
| NYSTA Maintenance Management System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance Management System | TO | NYSTA Asset Management System for Maintenance          |
| NYSTA Maintenance Management System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance Management System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Maintenance Management System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance Management System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Toll Data Storage System      | TO | NYSTA Maintenance and Construction                     |
| NYSTA Toll Data Storage System      | TO | NYSTA Statewide Operations Center                      |

|   |   |
|---|---|
| NYSTA Toll Data Storage System                  | TO NYSTA Toll Operations                                  |
| NYSTA Toll Data Storage System                  | TO NYSTA Maintenance and Construction                     |
| NYSTA Toll Data Storage System                  | TO NYSTA Statewide Operations Center                      |
| NYSTA Toll Data Storage System                  | TO NYSTA Toll Operations                                  |
| NYSTA Toll Data Storage System                  | TO NYSTA Maintenance and Construction                     |
| NYSTA Toll Data Storage System                  | TO NYSTA Statewide Operations Center                      |
| NYSTA Toll Data Storage System                  | TO NYSTA Toll Operations                                  |
| NYSTA Toll Data Storage System                  | TO NYSTA Maintenance and Construction                     |
| NYSTA Toll Data Storage System                  | TO NYSTA Statewide Operations Center                      |
| NYSTA Toll Data Storage System                  | TO NYSTA Toll Operations                                  |
| NYSTA Toll Data Storage System                  | TO NYSTA Maintenance and Construction                     |
| NYSTA Toll Data Storage System                  | TO NYSTA Statewide Operations Center                      |
| NYSTA Toll Data Storage System                  | TO NYSTA Toll Operations                                  |
| NYSTA Toll Data Storage System                  | TO NYSTA Maintenance and Construction                     |
| NYSTA Toll Data Storage System                  | TO NYSTA Statewide Operations Center                      |
| NYSTA Toll Data Storage System                  | TO NYSTA Toll Operations                                  |
| NYSTA Toll Data Storage System                  | TO NYSTA Maintenance and Construction                     |
| NYSTA Toll Data Storage System                  | TO NYSTA Statewide Operations Center                      |
| NYSTA Toll Data Storage System                  | TO NYSTA Toll Operations                                  |
| NYSTA Toll Data Storage System                  | TO NYSTA Maintenance and Construction                     |
| NYSTA Toll Data Storage System                  | TO NYSTA Statewide Operations Center                      |
| NYSTA Toll Data Storage System                  | TO NYSTA Toll Operations                                  |
| NYSTA Toll Data Storage System                  | TO NYSTA Maintenance and Construction                     |
| NYSTA Toll Data Storage System                  | TO NYSTA Statewide Operations Center                      |
| NYSTA Toll Data Storage System                  | TO NYSTA Toll Operations                                  |
| NYSTA Toll Data Storage System                  | TO NYSTA Maintenance and Construction                     |
| NYSTA Toll Data Storage System                  | TO NYSTA Statewide Operations Center                      |
| NYSTA Toll Data Storage System                  | TO NYSTA Toll Operations                                  |
| NYSTA Toll Data Storage System                  | TO NYSTA Maintenance and Construction                     |
| NYSTA Toll Data Storage System                  | TO NYSTA Statewide Operations Center                      |
| NYSTA Toll Data Storage System                  | TO NYSTA Toll Operations                                  |
| NYSTA Toll Data Storage System                  | TO NYSTA Maintenance and Construction                     |
| NYSTA Toll Data Storage System                  | TO NYSTA Statewide Operations Center                      |
| NYSTA Toll Data Storage System                  | TO NYSTA Toll Operations                                  |
| NYSTA Toll Data Storage System                  | TO NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO NYSTA Tarrytown Equipment Hub                          |

|   |    |  |
|---|----|--|
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |

|   |    |  |
|---|----|--|
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Traffic Data Storage and Retrieval System | TO | NYSTA Tarrytown Equipment Hub                          |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

## Architecture Flow

archived data product requests

Archived Data User Systems To Archived Data Management Subsystem

### **Inventory**

|  |    |  |
|--|----|--|
| Academic / Research Organizations              | TO | Bee-Line Data Management System                      |
| Academic / Research Organizations              | TO | HVTMC Incident Data Archive                          |
| Academic / Research Organizations              | TO | HVTMC Traffic Data Archive                           |
| Academic / Research Organizations              | TO | Metro North Data Management System                   |
| Academic / Research Organizations              | TO | NYSBA Toll Archive System                            |
| Academic / Research Organizations              | TO | NYSDOT Maintenance Management System                 |
| Academic / Research Organizations              | TO | NYSTA Incident Data Archive                          |
| Academic / Research Organizations              | TO | NYSTA Infrastructure Inventory and Inspection System |
| Academic / Research Organizations              | TO | NYSTA Maintenance Management System                  |
| Academic / Research Organizations              | TO | NYSTA Toll Data Storage System                       |
| Academic / Research Organizations              | TO | NYSTA Traffic Data Storage and Retrieval System      |
| HVTMC Freeway Management System Archive Access | TO | HVTMC Incident Data Archive                          |
| HVTMC Freeway Management System Archive Access | TO | HVTMC Traffic Data Archive                           |
| HVTMC Freeway Management System Archive Access | TO | NYSDOT Maintenance Management System                 |
| Transit Planners                               | TO | Bee-Line Data Management System                      |
| Transit Planners                               | TO | Metro North Data Management System                   |
| Transportation Planners                        | TO | Bee-Line Data Management System                      |
| Transportation Planners                        | TO | HVTMC Incident Data Archive                          |
| Transportation Planners                        | TO | HVTMC Traffic Data Archive                           |
| Transportation Planners                        | TO | Metro North Data Management System                   |
| Transportation Planners                        | TO | NYSBA Toll Archive System                            |
| Transportation Planners                        | TO | NYSDOT Maintenance Management System                 |
| Transportation Planners                        | TO | NYSTA Incident Data Archive                          |
| Transportation Planners                        | TO | NYSTA Infrastructure Inventory and Inspection System |
| Transportation Planners                        | TO | NYSTA Maintenance Management System                  |
| Transportation Planners                        | TO | NYSTA Toll Data Storage System                       |
| Transportation Planners                        | TO | NYSTA Traffic Data Storage and Retrieval System      |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

## Architecture Flow

archived data products

Archived Data Management Subsystem To Archived Data User Systems

### **Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Data Management System                         | TO | Academic / Research Organizations                 |
| Bee-Line Data Management System                         | TO | Transit Planners                                  |
| Bee-Line Data Management System                         | TO | Transportation Planners                           |
| HVTMC Incident Data Archive                             | TO | Academic / Research Organizations                 |
| HVTMC Incident Data Archive                             | TO | HVTMC Freeway Management System<br>Archive Access |
| HVTMC Incident Data Archive                             | TO | Transportation Planners                           |
| HVTMC Traffic Data Archive                              | TO | Academic / Research Organizations                 |
| HVTMC Traffic Data Archive                              | TO | HVTMC Freeway Management System<br>Archive Access |
| HVTMC Traffic Data Archive                              | TO | Transportation Planners                           |
| Metro North Data Management System                      | TO | Academic / Research Organizations                 |
| Metro North Data Management System                      | TO | Transit Planners                                  |
| Metro North Data Management System                      | TO | Transportation Planners                           |
| NYSBA Toll Archive System                               | TO | Academic / Research Organizations                 |
| NYSBA Toll Archive System                               | TO | Transportation Planners                           |
| NYSDOT Maintenance Management System                    | TO | Academic / Research Organizations                 |
| NYSDOT Maintenance Management System                    | TO | HVTMC Freeway Management System<br>Archive Access |
| NYSDOT Maintenance Management System                    | TO | Transportation Planners                           |
| NYSTA Incident Data Archive                             | TO | Academic / Research Organizations                 |
| NYSTA Incident Data Archive                             | TO | Transportation Planners                           |
| NYSTA Infrastructure Inventory and<br>Inspection System | TO | Academic / Research Organizations                 |
| NYSTA Infrastructure Inventory and<br>Inspection System | TO | Transportation Planners                           |
| NYSTA Maintenance Management System                     | TO | Academic / Research Organizations                 |
| NYSTA Maintenance Management System                     | TO | Transportation Planners                           |
| NYSTA Toll Data Storage System                          | TO | Academic / Research Organizations                 |
| NYSTA Toll Data Storage System                          | TO | Transportation Planners                           |
| NYSTA Traffic Data Storage and Retrieval<br>System      | TO | Academic / Research Organizations                 |
| NYSTA Traffic Data Storage and Retrieval<br>System      | TO | Transportation Planners                           |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)



### **Architecture Flow**

arriving train information

Wayside Equipment To Roadway Subsystem

### **Inventory**

Railroad Grade Crossing Activation Equipment TO Local Sensors and CCTV Equipment

Railroad Grade Crossing Activation Equipment TO NYSDOT Sensors and CCTV Equipment

Railroad Grade Crossing Activation Equipment TO TRANSCOM Sensors and CCTV Equipment

### **Standards**

(IEEE) Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection  
(Data Dictionary, Message Set )

### **Architecture Flow**

asset archive data

Asset Management To Archived Data Management Subsystem

### **Inventory**

NYSTA Asset Management System for Maintenance TO NYSTA Infrastructure Inventory and Inspection System

NYSTA Asset Management System for Maintenance TO NYSTA Maintenance Management System

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

### **Architecture Flow**

asset inventory

Asset Management To Maintenance and Construction Management

### **Inventory**

Local Asset Management System for Maintenance TO Local Maintenance and Construction

NYSBA Asset Management System for Maintenance TO NYSBA Maintenance and Construction

NYSDOT Asset Management System for Maintenance TO NYSDOT Maintenance and Construction

NYSTA Asset Management System for Maintenance TO NYSTA Maintenance and Construction

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

asset restrictions

Asset Management To Maintenance and Construction Management

**Inventory**

|  |    |                                     |
|--|----|-------------------------------------|
| Local Asset Management System for Maintenance  | TO | Local Maintenance and Construction  |
| NYSBA Asset Management System for Maintenance  | TO | NYSBA Maintenance and Construction  |
| NYSDOT Asset Management System for Maintenance | TO | NYSDOT Maintenance and Construction |
| NYSTA Asset Management System for Maintenance  | TO | NYSTA Maintenance and Construction  |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

asset status update

Maintenance and Construction Management To Asset Management

**Inventory**

|                                     |    |  |
|-------------------------------------|----|--|
| Local Maintenance and Construction  | TO | Local Asset Management System for Maintenance  |
| NYSBA Maintenance and Construction  | TO | NYSBA Asset Management System for Maintenance  |
| NYSDOT Maintenance and Construction | TO | NYSDOT Asset Management System for Maintenance |
| NYSTA Maintenance and Construction  | TO | NYSTA Asset Management System for Maintenance  |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

bad tag list

Transit Management To Transit Vehicle Subsystem

**Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles IT Equipment      |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles IT Equipment |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles IT Equipment  |
| PART Bus System                           | TO | PART Bus Vehicles IT Equipment          |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles IT Equipment  |

**Standards**

(AASHTO/ITE/NEMA) TCIP - Fare Collection (FC) Business Area Standard (Data Dictionary, Message Set )

**Architecture Flow**

basic vehicle measures

Basic Vehicle To Vehicle

**Inventory**

|                                    |    |                                |
|------------------------------------|----|--------------------------------|
| Device That Reads Vehicle Measures | TO | NYSTA DSRC Receiving Equipment |
| Device That Reads Vehicle Measures | TO | NYSTA DSRC Receiving Equipment |
| Device That Reads Vehicle Measures | TO | NYSTA DSRC Receiving Equipment |
| Device That Reads Vehicle Measures | TO | NYSTA DSRC Receiving Equipment |
| Device That Reads Vehicle Measures | TO | NYSTA DSRC Receiving Equipment |
| Device That Reads Vehicle Measures | TO | NYSTA DSRC Receiving Equipment |

**Standards**

(SAE) ITS Data Bus Data Security Services Recommended Practice (Communications Protocol, Data Dictionary, Message Set )

(SAE) ITS Data Bus Gateway Recommended Practice (Communications Protocol, Data Dictionary, Message Set )

(SAE) ITS Data Bus Protocol - Application Layer Recommended Practice (Communications Protocol, Data Dictionary, Message Set )

(SAE) ITS Data Bus Protocol - Link Layer Recommended Practice (Communications Protocol)

(SAE) ITS Data Bus Protocol - Physical Layer Recommended Practice (Communications Protocol)

(SAE) ITS Data Bus Protocol - Thin Transport Layer Recommended Practice (Communications Protocol)

**Architecture Flow**

broadcast advisories

Roadway Subsystem To Basic Vehicle

**Inventory**

|   |    |   |
|---|----|---|
| NYSTA DMS and HAR Information Broadcast Equipment | TO | Individual Vehicle Car Radio / CB-Radio |
|---|----|---|

**Standards**

None

## Architecture Flow

broadcast information

Information Service Provider To Personal Information Access

### **Inventory**

|  |    |  |
|--|----|--|
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |











|  |    |                          |
|--|----|--------------------------|
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(EIA/CEA) Data Radio Channel (DARC) System (Communications Protocol)

(EIA/CEA) Subcarrier Traffic Information Channel (STIC) System (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) ISP-Vehicle Location Referencing Standard (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

(SAE) Standard for ATIS Message Sets Delivered Over Bandwidth Restricted Media (Communications Protocol, Data Dictionary, Message Set )

## **Architecture Flow**

care facility status

Care Facility To Emergency Management

### **Inventory**

|   |    |                                       |
|---|----|---------------------------------------|
| Hospital/Care Facility Information System | TO | Local Emergency Dispatch              |
| Hospital/Care Facility Information System | TO | Local Emergency Dispatch              |
| Hospital/Care Facility Information System | TO | Local Emergency Dispatch              |
| Hospital/Care Facility Information System | TO | NYSP Central Communication/Dispatch   |
| Hospital/Care Facility Information System | TO | NYSP Central Communication/Dispatch   |
| Hospital/Care Facility Information System | TO | NYSP Central Communication/Dispatch   |
| Hospital/Care Facility Information System | TO | NYSTA Central Communications/Dispatch |
| Hospital/Care Facility Information System | TO | NYSTA Central Communications/Dispatch |
| Hospital/Care Facility Information System | TO | NYSTA Central Communications/Dispatch |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(IEEE) Standard for Public Safety IMMS for use by EMCs (Data Dictionary, Message Set )

## **Architecture Flow**

care facility status request

Emergency Management To Care Facility

### **Inventory**

|                                       |    |   |
|---------------------------------------|----|---|
| Local Emergency Dispatch              | TO | Hospital/Care Facility Information System |
| Local Emergency Dispatch              | TO | Hospital/Care Facility Information System |
| Local Emergency Dispatch              | TO | Hospital/Care Facility Information System |
| NYSP Central Communication/Dispatch   | TO | Hospital/Care Facility Information System |
| NYSP Central Communication/Dispatch   | TO | Hospital/Care Facility Information System |
| NYSP Central Communication/Dispatch   | TO | Hospital/Care Facility Information System |
| NYSTA Central Communications/Dispatch | TO | Hospital/Care Facility Information System |
| NYSTA Central Communications/Dispatch | TO | Hospital/Care Facility Information System |
| NYSTA Central Communications/Dispatch | TO | Hospital/Care Facility Information System |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(IEEE) Standard for Public Safety IMMS for use by EMCs (Data Dictionary, Message Set )

**Architecture Flow**

credentials information

Commercial Vehicle Administration To Commercial Vehicle Check

**Inventory**

|  |    |  |
|--|----|--|
| Statewide Commercial Vehicle Information Exchange Window (CVIEW) | TO | Statewide CVO Information Exchange Network |
| Statewide Commercial Vehicle Information Exchange Window (CVIEW) | TO | Statewide CVO Information Exchange Network |
| Statewide Commercial Vehicle Information Exchange Window (CVIEW) | TO | Statewide CVO Information Exchange Network |
| Statewide Commercial Vehicle Information Exchange Window (CVIEW) | TO | Statewide CVO Information Exchange Network |
| Statewide Commercial Vehicle Information Exchange Window (CVIEW) | TO | Statewide CVO Information Exchange Network |

**Standards**

(ANSI) Commercial Vehicle Credentials (Data Dictionary, Message Set )

**Architecture Flow**

credentials status information

Commercial Vehicle Administration To Commercial Vehicle Check

**Inventory**

|  |    |  |
|--|----|--|
| Statewide Commercial Vehicle Information Exchange Window (CVIEW) | TO | Statewide CVO Information Exchange Network |
| Statewide Commercial Vehicle Information Exchange Window (CVIEW) | TO | Statewide CVO Information Exchange Network |
| Statewide Commercial Vehicle Information Exchange Window (CVIEW) | TO | Statewide CVO Information Exchange Network |
| Statewide Commercial Vehicle Information Exchange Window (CVIEW) | TO | Statewide CVO Information Exchange Network |
| Statewide Commercial Vehicle Information Exchange Window (CVIEW) | TO | Statewide CVO Information Exchange Network |

**Standards**

(ANSI) Commercial Vehicle Safety and Credentials Information Exchange (Data Dictionary, Message Set )

**Architecture Flow**

crew movements

Maintenance and Construction Field Personnel To Maintenance and Construction Vehicle

**Inventory**

|                                    |    |                                       |
|------------------------------------|----|---------------------------------------|
| Local Maintenance Field Personnel  | TO | Local Road Maintenance Vehicles       |
| NYSBA Maintenance Field Personnel  | TO | Bridge Authority Maintenance Vehicles |
| NYSBA Maintenance Field Personnel  | TO | NYSBA Sensors and CCTV Equipment      |
| NYSDOT Maintenance Field Personnel | TO | NYSDOT Road Maintenance Vehicles      |
| NYSDOT Maintenance Field Personnel | TO | NYSDOT Sensors and CCTV Equipment     |
| NYSTA Maintenance Field Personnel  | TO | NYSTA DSRC Equipment                  |
| NYSTA Maintenance Field Personnel  | TO | NYSTA Road Maintenance Vehicles       |
| NYSTA Maintenance Field Personnel  | TO | NYSTA Sensors and CCTV Equipment      |

**Standards**

None

**Architecture Flow**

crossing call

Pedestrians To Roadway Subsystem

**Inventory**

|                                    |    |                                  |
|------------------------------------|----|----------------------------------|
| Individuals Using Crossing Signals | TO | Local Sensors and CCTV Equipment |
|------------------------------------|----|----------------------------------|

**Standards**

None

**Architecture Flow**

crossing permission

Roadway Subsystem To Pedestrians

**Inventory**

|                                  |    |                                    |
|----------------------------------|----|------------------------------------|
| Local Sensors and CCTV Equipment | TO | Individuals Using Crossing Signals |
|----------------------------------|----|------------------------------------|

**Standards**

None

**Architecture Flow**

current asset restrictions

Maintenance and Construction Management To Emergency Management

**Inventory**

|                                    |    |  |
|------------------------------------|----|--|
| Local Maintenance and Construction | TO | HVTMC Freeway Management System        |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System        |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System        |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System        |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System        |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System        |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System        |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System        |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System        |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System        |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System        |
| NYSBA Maintenance and Construction | TO | NYSBA ITS Information Service Provider |
| NYSBA Maintenance and Construction | TO | NYSBA ITS Information Service Provider |
| NYSBA Maintenance and Construction | TO | NYSBA ITS Information Service Provider |
| NYSBA Maintenance and Construction | TO | NYSBA Operations Center                |
| NYSBA Maintenance and Construction | TO | NYSBA Operations Center                |
| NYSBA Maintenance and Construction | TO | NYSBA Operations Center                |
| NYSBA Maintenance and Construction | TO | NYSBA Satellite Operations Centers     |
| NYSBA Maintenance and Construction | TO | NYSBA Satellite Operations Centers     |
| NYSBA Maintenance and Construction | TO | NYSBA Satellite Operations Centers     |
| NYSBA Maintenance and Construction | TO | NYSBA ITS Information Service Provider |
| NYSBA Maintenance and Construction | TO | NYSBA ITS Information Service Provider |
| NYSBA Maintenance and Construction | TO | NYSBA ITS Information Service Provider |
| NYSBA Maintenance and Construction | TO | NYSBA Operations Center                |
| NYSBA Maintenance and Construction | TO | NYSBA Operations Center                |
| NYSBA Maintenance and Construction | TO | NYSBA Operations Center                |
| NYSBA Maintenance and Construction | TO | NYSBA Satellite Operations Centers     |
| NYSBA Maintenance and Construction | TO | NYSBA Satellite Operations Centers     |
| NYSBA Maintenance and Construction | TO | NYSBA Satellite Operations Centers     |
| NYSBA Maintenance and Construction | TO | NYSBA ITS Information Service Provider |
| NYSBA Maintenance and Construction | TO | NYSBA ITS Information Service Provider |
| NYSBA Maintenance and Construction | TO | NYSBA ITS Information Service Provider |
| NYSBA Maintenance and Construction | TO | NYSBA Operations Center                |
| NYSBA Maintenance and Construction | TO | NYSBA Operations Center                |
| NYSBA Maintenance and Construction | TO | NYSBA Operations Center                |
| NYSBA Maintenance and Construction | TO | NYSBA Satellite Operations Centers     |
| NYSBA Maintenance and Construction | TO | NYSBA Satellite Operations Centers     |
| NYSBA Maintenance and Construction | TO | NYSBA Satellite Operations Centers     |
| NYSBA Maintenance and Construction | TO | NYSBA ITS Information Service Provider |
| NYSBA Maintenance and Construction | TO | NYSBA ITS Information Service Provider |
| NYSBA Maintenance and Construction | TO | NYSBA ITS Information Service Provider |
| NYSBA Maintenance and Construction | TO | NYSBA Operations Center                |
| NYSBA Maintenance and Construction | TO | NYSBA Operations Center                |
| NYSBA Maintenance and Construction | TO | NYSBA Operations Center                |
| NYSBA Maintenance and Construction | TO | NYSBA Satellite Operations Centers     |



|                                    |    |  |
|------------------------------------|----|--|
| NYSTA Maintenance and Construction | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Maintenance and Construction | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Maintenance and Construction | TO | NYSTA ITS Information Service Provider |
| NYSTA Maintenance and Construction | TO | NYSTA ITS Information Service Provider |
| NYSTA Maintenance and Construction | TO | NYSTA ITS Information Service Provider |
| NYSTA Maintenance and Construction | TO | NYSTA Statewide Operations Center      |
| NYSTA Maintenance and Construction | TO | NYSTA Statewide Operations Center      |
| NYSTA Maintenance and Construction | TO | NYSTA Statewide Operations Center      |
| NYSTA Maintenance and Construction | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Maintenance and Construction | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Maintenance and Construction | TO | NYSTA Tarrytown Equipment Hub          |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

**Architecture Flow**

data collection and monitoring control

Archived Data Management Subsystem To Roadway Subsystem

**Inventory**

|                                      |    |                                   |
|--------------------------------------|----|-----------------------------------|
| HVTMC Traffic Data Archive           | TO | NYSDOT RWIS Servers               |
| HVTMC Traffic Data Archive           | TO | NYSDOT RWIS Servers               |
| HVTMC Traffic Data Archive           | TO | NYSDOT RWIS Servers               |
| HVTMC Traffic Data Archive           | TO | NYSDOT Sensors and CCTV Equipment |
| HVTMC Traffic Data Archive           | TO | NYSDOT Sensors and CCTV Equipment |
| HVTMC Traffic Data Archive           | TO | NYSDOT Sensors and CCTV Equipment |
| NYSBA Toll Archive System            | TO | NYSBA Sensors and CCTV Equipment  |
| NYSBA Toll Archive System            | TO | NYSBA Sensors and CCTV Equipment  |
| NYSBA Toll Archive System            | TO | NYSBA Sensors and CCTV Equipment  |
| NYSDOT Maintenance Management System | TO | NYSDOT RWIS Servers               |
| NYSDOT Maintenance Management System | TO | NYSDOT RWIS Servers               |
| NYSDOT Maintenance Management System | TO | NYSDOT RWIS Servers               |

**Standards**

(AASHTO/ITE/NEMA) Data Collection & Monitoring Devices (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

**Architecture Flow**

demand responsive transit plan

Transit Management To Information Service Provider

**Inventory**

|   |    |  |
|---|----|--|
| Bee-Line Bus Operations Dispatch System | TO | HVTMC ITS Information Service Provider             |
| Bee-Line Bus Operations Dispatch System | TO | SATIN (Service Area Travelers Interactive Network) |
| City / Local Transit Operations         | TO | SATIN (Service Area Travelers Interactive Network) |
| Dutchess LOOP Bus Dispatch System       | TO | HVTMC ITS Information Service Provider             |
| PART Bus System                         | TO | HVTMC ITS Information Service Provider             |
| Rockland TOR                            | TO | HVTMC ITS Information Service Provider             |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

demand responsive transit request

Information Service Provider To Transit Management

**Inventory**

|  |    |   |
|--|----|---|
| HVTMC ITS Information Service Provider             | TO | Bee-Line Bus Operations Dispatch System |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | PART Bus System                         |
| HVTMC ITS Information Service Provider             | TO | Rockland TOR                            |
| SATIN (Service Area Travelers Interactive Network) | TO | Bee-Line Bus Operations Dispatch System |
| SATIN (Service Area Travelers Interactive Network) | TO | City / Local Transit Operations         |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

dispatch information

Emergency Vehicle Subsystem To Emergency Personnel

**Inventory**

|  |    |                              |
|--|----|------------------------------|
| Local Emergency Vehicles (Fire, EMS, Police) | TO | Local Emergency Personnel    |
| MTA Mobile Communications Device             | TO | MTA Police Department        |
| NYSP Vehicles                                | TO | NYSP State Police All Troops |
| NYSTA Troop T Vehicles                       | TO | NYSTA State Police Troop T   |

**Standards**

None



**Architecture Flow**

driver information

Maintenance and Construction Vehicle To Driver

**Inventory**

|   |    |                            |
|---|----|----------------------------|
| Bridge Authority Maintenance Vehicles                 | TO | Driver Operating A Vehicle |
| Local Road Maintenance Vehicles                       | TO | Driver Operating A Vehicle |
| NYSDOT DMS and HAR Information<br>Broadcast Equipment | TO | Driver Operating A Vehicle |
| NYSDOT Road Maintenance Vehicles                      | TO | Driver Operating A Vehicle |
| NYSTA DMS and HAR Information<br>Broadcast Equipment  | TO | Driver Operating A Vehicle |
| NYSTA Road Maintenance Vehicles                       | TO | Driver Operating A Vehicle |

**Standards**

None

## Architecture Flow

driver instructions

### Transit Management To Transit Vehicle Subsystem

#### **Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles Communications Equipment     |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles Communications Equipment     |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles IT Equipment                 |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles IT Equipment                 |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles Communications Equipment      |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles Communications Equipment      |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles IT Equipment                  |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles IT Equipment                  |
| PART Bus System                           | TO | PART Bus Vehicles Communications Equipment              |
| PART Bus System                           | TO | PART Bus Vehicles Communications Equipment              |
| PART Bus System                           | TO | PART Bus Vehicles IT Equipment                          |
| PART Bus System                           | TO | PART Bus Vehicles IT Equipment                          |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles Communications Equipment      |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles Communications Equipment      |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles IT Equipment                  |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles IT Equipment                  |

#### **Standards**

(AASHTO/ITE/NEMA) TCIP - Control Center (CC) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

## **Architecture Flow**

driver updates

Vehicle To Driver

### **Inventory**

|  |    |                            |
|--|----|----------------------------|
| NYSBA Toll Tag Interface                           | TO | Driver Operating A Vehicle |
| NYSBA Toll Tag Interface                           | TO | Driver Operating A Vehicle |
| NYSBA Toll Tag Interface                           | TO | Driver Operating A Vehicle |
| NYSBA Toll Tag Interface                           | TO | Driver Operating A Vehicle |
| NYSTA Toll Tag Interface                           | TO | Driver Operating A Vehicle |
| NYSTA Toll Tag Interface                           | TO | Driver Operating A Vehicle |
| NYSTA Toll Tag Interface                           | TO | Driver Operating A Vehicle |
| NYSTA Toll Tag Interface                           | TO | Driver Operating A Vehicle |
| System That Provides Accurate Position Information | TO | Driver Operating A Vehicle |
| System That Provides Accurate Position Information | TO | Driver Operating A Vehicle |
| System That Provides Accurate Position Information | TO | Driver Operating A Vehicle |
| System That Provides Accurate Position Information | TO | Driver Operating A Vehicle |

### **Standards**

(SAE) Adaptive Cruise Control: Operating Characteristics and User Interface (Human Factors)

(SAE) Forward Collision Warning: Operating Characteristics and User Interface (Human Factors)

(SAE) ITS In-Vehicle Message Priority (Human Factors)

(SAE) Measurement of Driver Visual Behavior Using Video Based Methods (Def. & Meas.) (Human Factors)

## Architecture Flow

emergency acknowledge

Emergency Management To Personal Information Access

### **Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles Communications Equipment     |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles IT Equipment                 |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles Communications Equipment     |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles IT Equipment                 |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles Communications Equipment     |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles IT Equipment                 |
| Local Emergency Dispatch                  | TO | Traveler Cellular and Land-Line Telephones              |
| Local Emergency Dispatch                  | TO | Traveler Cellular and Land-Line Telephones              |
| Local Emergency Dispatch                  | TO | Traveler Cellular and Land-Line Telephones              |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles Communications Equipment      |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles IT Equipment                  |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles Communications Equipment      |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles IT Equipment                  |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles Communications Equipment      |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles IT Equipment                  |
| NYSP Central Communication/Dispatch       | TO | Traveler Cellular and Land-Line Telephones              |
| NYSP Central Communication/Dispatch       | TO | Traveler Cellular and Land-Line Telephones              |
| NYSP Central Communication/Dispatch       | TO | Traveler Cellular and Land-Line Telephones              |
| NYSTA Central Communications/Dispatch     | TO | Traveler Cellular and Land-Line Telephones              |
| NYSTA Central Communications/Dispatch     | TO | Traveler Cellular and Land-Line Telephones              |
| NYSTA Central Communications/Dispatch     | TO | Traveler Cellular and Land-Line Telephones              |
| PART Bus System                           | TO | PART Bus Vehicles Communications Equipment              |
| PART Bus System                           | TO | PART Bus Vehicles IT Equipment                          |
| PART Bus System                           | TO | PART Bus Vehicles Communications Equipment              |
| PART Bus System                           | TO | PART Bus Vehicles IT Equipment                          |
| PART Bus System                           | TO | PART Bus Vehicles Communications Equipment              |
| PART Bus System                           | TO | PART Bus Vehicles IT Equipment                          |

|   |    |   |
|---|----|---|
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles Communications Equipment      |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles IT Equipment                  |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles Communications Equipment      |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles IT Equipment                  |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles Communications Equipment      |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles IT Equipment                  |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles Communications Equipment     |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles IT Equipment                 |
| Local Emergency Dispatch                  | TO | Traveler Cellular and Land-Line Telephones              |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles Communications Equipment      |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles IT Equipment                  |
| NYSP Central Communication/Dispatch       | TO | Traveler Cellular and Land-Line Telephones              |
| NYSTA Central Communications/Dispatch     | TO | Traveler Cellular and Land-Line Telephones              |
| PART Bus System                           | TO | PART Bus Vehicles Communications Equipment              |
| PART Bus System                           | TO | PART Bus Vehicles IT Equipment                          |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles Communications Equipment      |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles IT Equipment                  |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) On-Board Land Vehicle Mayday Reporting Interface (Data Dictionary, Message Set )

## Architecture Flow

emergency archive data

Emergency Management To Archived Data Management Subsystem

### **Inventory**

|                                       |    |   |
|---------------------------------------|----|---|
| NYSP Central Communication/Dispatch   | TO | HVTMC Incident Data Archive                 |
| NYSP Central Communication/Dispatch   | TO | HVTMC Incident Data Archive                 |
| NYSP Central Communication/Dispatch   | TO | HVTMC Incident Data Archive                 |
| NYSP Central Communication/Dispatch   | TO | NYSP Statewide SJS Record Management System |
| NYSP Central Communication/Dispatch   | TO | NYSP Statewide SJS Record Management System |
| NYSP Central Communication/Dispatch   | TO | NYSP Statewide SJS Record Management System |
| NYSTA Central Communications/Dispatch | TO | NYSP Statewide SJS Record Management System |
| NYSTA Central Communications/Dispatch | TO | NYSP Statewide SJS Record Management System |
| NYSTA Central Communications/Dispatch | TO | NYSP Statewide SJS Record Management System |
| NYSTA Central Communications/Dispatch | TO | NYSTA Incident Data Archive                 |
| NYSTA Central Communications/Dispatch | TO | NYSTA Incident Data Archive                 |
| NYSTA Central Communications/Dispatch | TO | NYSTA Incident Data Archive                 |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Common Incident Management Message Sets (IMMS) for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

## Architecture Flow

emergency dispatch requests

Emergency Management To Emergency Vehicle Subsystem

### **Inventory**

|                                     |    |  |
|-------------------------------------|----|--|
| Local Emergency Dispatch            | TO | Local Emergency Vehicles (Fire, EMS, Police) |
| NYSP Central Communication/Dispatch | TO | NYSDOT HELP Trucks                           |
| NYSP Central Communication/Dispatch | TO | NYSP Vehicles                                |

### **Standards**

None

**Architecture Flow**

emergency dispatch response

Emergency Vehicle Subsystem To Emergency Management

**Inventory**

|  |    |                                     |
|--|----|-------------------------------------|
| Local Emergency Vehicles (Fire, EMS, Police) | TO | Local Emergency Dispatch            |
| NYSDOT HELP Trucks                           | TO | NYSP Central Communication/Dispatch |
| NYSP Vehicles                                | TO | NYSP Central Communication/Dispatch |

**Standards**

None

## Architecture Flow

emergency notification

### Personal Information Access To Emergency Management

#### **Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Vehicles Communications Equipment          | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment                      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Para Transit Vehicles Communications Equipment | TO | Bee-Line Bus Operations Dispatch System   |
| Dutchess LOOP Bus Vehicles Communications Equipment     | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment                 | TO | Dutchess LOOP Bus Dispatch System         |
| Metro North Rail Vehicles Communications Equipment      | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment                  | TO | Metro North Rail Operation Control Center |
| PART Bus Vehicles Communications Equipment              | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment                          | TO | PART Bus System                           |
| Rockland TOR Bus Vehicles Communications Equipment      | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment                  | TO | Rockland TOR                              |
| Traveler Cellular and Land-Line Telephones              | TO | Local Emergency Dispatch                  |
| Traveler Cellular and Land-Line Telephones              | TO | NYSP Central Communication/Dispatch       |
| Traveler Cellular and Land-Line Telephones              | TO | NYSTA Central Communications/Dispatch     |
| Bee-Line Bus Vehicles Communications Equipment          | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles Communications Equipment          | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles Communications Equipment          | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles Communications Equipment          | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment                      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment                      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment                      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment                      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Para Transit Vehicles Communications Equipment | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Para Transit Vehicles Communications Equipment | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Para Transit Vehicles Communications Equipment | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Para Transit Vehicles Communications Equipment | TO | Bee-Line Bus Operations Dispatch System   |
| Dutchess LOOP Bus Vehicles Communications Equipment     | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles Communications Equipment     | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles Communications Equipment     | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles Communications Equipment     | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment                 | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment                 | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment                 | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment                 | TO | Dutchess LOOP Bus Dispatch System         |



|   |    |   |
|---|----|---|
| Metro North Rail Vehicles Communications Equipment      | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles Communications Equipment      | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles Communications Equipment      | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles Communications Equipment      | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment                  | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment                  | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment                  | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment                  | TO | Metro North Rail Operation Control Center |
| PART Bus Vehicles Communications Equipment              | TO | PART Bus System                           |
| PART Bus Vehicles Communications Equipment              | TO | PART Bus System                           |
| PART Bus Vehicles Communications Equipment              | TO | PART Bus System                           |
| PART Bus Vehicles Communications Equipment              | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment                          | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment                          | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment                          | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment                          | TO | PART Bus System                           |
| Rockland TOR Bus Vehicles Communications Equipment      | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles Communications Equipment      | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles Communications Equipment      | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles Communications Equipment      | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment                  | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment                  | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment                  | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment                  | TO | Rockland TOR                              |
| Traveler Cellular and Land-Line Telephones              | TO | Local Emergency Dispatch                  |
| Traveler Cellular and Land-Line Telephones              | TO | NYSP Central Communication/Dispatch       |
| Traveler Cellular and Land-Line Telephones              | TO | NYSTA Central Communications/Dispatch     |
| Traveler Cellular and Land-Line Telephones              | TO | Local Emergency Dispatch                  |
| Traveler Cellular and Land-Line Telephones              | TO | Local Emergency Dispatch                  |
| Traveler Cellular and Land-Line Telephones              | TO | Local Emergency Dispatch                  |
| Traveler Cellular and Land-Line Telephones              | TO | NYSP Central Communication/Dispatch       |
| Traveler Cellular and Land-Line Telephones              | TO | NYSP Central Communication/Dispatch       |
| Traveler Cellular and Land-Line Telephones              | TO | NYSTA Central Communications/Dispatch     |
| Traveler Cellular and Land-Line Telephones              | TO | NYSTA Central Communications/Dispatch     |
| Traveler Cellular and Land-Line Telephones              | TO | NYSTA Central Communications/Dispatch     |
| Bee-Line Bus Vehicles Communications Equipment          | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles Communications Equipment          | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment                      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment                      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Para Transit Vehicles Communications Equipment | TO | Bee-Line Bus Operations Dispatch System   |

|   |    |   |
|---|----|---|
| Bee-Line Para Transit Vehicles Communications Equipment | TO | Bee-Line Bus Operations Dispatch System   |
| Dutchess LOOP Bus Vehicles Communications Equipment     | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles Communications Equipment     | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment                 | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment                 | TO | Dutchess LOOP Bus Dispatch System         |
| Metro North Rail Vehicles Communications Equipment      | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles Communications Equipment      | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment                  | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment                  | TO | Metro North Rail Operation Control Center |
| PART Bus Vehicles Communications Equipment              | TO | PART Bus System                           |
| PART Bus Vehicles Communications Equipment              | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment                          | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment                          | TO | PART Bus System                           |
| Rockland TOR Bus Vehicles Communications Equipment      | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles Communications Equipment      | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment                  | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment                  | TO | Rockland TOR                              |
| Traveler Cellular and Land-Line Telephones              | TO | Local Emergency Dispatch                  |
| Traveler Cellular and Land-Line Telephones              | TO | Local Emergency Dispatch                  |
| Traveler Cellular and Land-Line Telephones              | TO | NYSP Central Communication/Dispatch       |
| Traveler Cellular and Land-Line Telephones              | TO | NYSP Central Communication/Dispatch       |
| Traveler Cellular and Land-Line Telephones              | TO | NYSTA Central Communications/Dispatch     |
| Traveler Cellular and Land-Line Telephones              | TO | NYSTA Central Communications/Dispatch     |
| Bee-Line Bus Vehicles Communications Equipment          | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment                      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Para Transit Vehicles Communications Equipment | TO | Bee-Line Bus Operations Dispatch System   |
| Dutchess LOOP Bus Vehicles Communications Equipment     | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment                 | TO | Dutchess LOOP Bus Dispatch System         |
| Metro North Rail Vehicles Communications Equipment      | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment                  | TO | Metro North Rail Operation Control Center |
| PART Bus Vehicles Communications Equipment              | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment                          | TO | PART Bus System                           |
| Rockland TOR Bus Vehicles Communications Equipment      | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment                  | TO | Rockland TOR                              |
| Traveler Cellular and Land-Line Telephones              | TO | Local Emergency Dispatch                  |
| Traveler Cellular and Land-Line Telephones              | TO | NYSP Central Communication/Dispatch       |
| Traveler Cellular and Land-Line Telephones              | TO | NYSTA Central Communications/Dispatch     |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) TCIP - Incident Management (IM) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

(SAE) On-Board Land Vehicle Mayday Reporting Interface (Data Dictionary, Message Set )

**Architecture Flow**

emergency operations request

Emergency System Operator To Emergency Management

**Inventory**

|                             |    |                                     |
|-----------------------------|----|-------------------------------------|
| Emergency Call 911 Operator | TO | Local Emergency Dispatch            |
| Emergency Call 911 Operator | TO | NYSP Central Communication/Dispatch |

**Standards**

None

**Architecture Flow**

emergency operations status

Emergency Management To Emergency System Operator

**Inventory**

|                                     |    |                             |
|-------------------------------------|----|-----------------------------|
| Local Emergency Dispatch            | TO | Emergency Call 911 Operator |
| NYSP Central Communication/Dispatch | TO | Emergency Call 911 Operator |

**Standards**

None

**Architecture Flow**

emergency personnel inputs

Emergency Personnel To Emergency Vehicle Subsystem

**Inventory**

|                              |    |  |
|------------------------------|----|--|
| Local Emergency Personnel    | TO | Local Emergency Vehicles (Fire, EMS, Police) |
| MTA Police Department        | TO | MTA Mobile Communications Device             |
| NYSP State Police All Troops | TO | NYSP Vehicles                                |
| NYSTA State Police Troop T   | TO | NYSTA Troop T Vehicles                       |

**Standards**

None

## **Architecture Flow**

emergency traffic control request

Emergency Management To Traffic Management

### **Inventory**

|                                     |    |                                 |
|-------------------------------------|----|---------------------------------|
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |

### **Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Objects for Signal Control Priority (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(IEEE) Standard for Traffic Incident Management Message Sets for Use by EMCs (Data Dictionary, Message Set )

## **Architecture Flow**

emergency traffic control response

Traffic Management To Emergency Management

### **Inventory**

|                                 |    |                                     |
|---------------------------------|----|-------------------------------------|
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |

### **Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Objects for Signal Control Priority (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(IEEE) Standard for Traffic Incident Management Message Sets for Use by EMCs (Data Dictionary, Message Set )

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

## **Architecture Flow**

emergency vehicle tracking data

Emergency Vehicle Subsystem To Emergency Management

### **Inventory**

|  |    |                                     |
|--|----|-------------------------------------|
| Local Emergency Vehicles (Fire, EMS, Police) | TO | Local Emergency Dispatch            |
| NYSDOT HELP Trucks                           | TO | NYSP Central Communication/Dispatch |
| NYSP Vehicles                                | TO | NYSP Central Communication/Dispatch |

### **Standards**

None

**Architecture Flow**

emissions data

Roadway Subsystem To Traffic Management

**Inventory**

|                                   |    |                                 |
|-----------------------------------|----|---------------------------------|
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System |

**Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Object Definitions for Environmental Sensor Stations & Roadside Weather Information System (Data Dictionary, Message Set )

## Architecture Flow

environmental conditions data

Maintenance and Construction Management To Surface Transportation Weather Service

### **Inventory**

|   |    |   |
|---|----|---|
| HVTMC Freeway Management System                         | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                         | TO | Weather Network Subscription                            |
| HVTMC Freeway Management System                         | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                         | TO | Weather Network Subscription                            |
| Local Maintenance and Construction                      | TO | Weather Network Subscription                            |
| Local Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSBA Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSBA Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSBA Operations Center                                 | TO | Weather Network Subscription                            |
| NYSBA Operations Center                                 | TO | Weather Network Subscription                            |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Maintenance and Construction                      |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Operations Center                                 |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Satellite Operations Centers                      |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Maintenance and Construction                      |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Operations Center                                 |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Satellite Operations Centers                      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction                     | TO | Weather Network Subscription                            |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction                     | TO | Weather Network Subscription                            |
| NYSDOT RWIS Servers                                     | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                                     | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                      |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                      |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                            |

|  |    |   |
|--|----|---|
| NYSTA Sensors and CCTV Equipment                       | TO | NYSTA Maintenance and Construction                      |
| NYSTA Sensors and CCTV Equipment                       | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Sensors and CCTV Equipment                       | TO | NYSTA Maintenance and Construction                      |
| NYSTA Sensors and CCTV Equipment                       | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Statewide Operations Center                      | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Statewide Operations Center                      | TO | Weather Network Subscription                            |
| NYSTA Statewide Operations Center                      | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Statewide Operations Center                      | TO | Weather Network Subscription                            |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                       |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                       |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System  |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                            |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                            |
| TRANSCOM Sensors and CCTV Equipment                    | TO | TRANSCOM Operations Information Center                  |
| TRANSCOM Sensors and CCTV Equipment                    | TO | TRANSCOM Operations Information Center                  |
| Weather Network Subscription                           | TO | HVTMC Freeway Management System                         |
| Weather Network Subscription                           | TO | Local Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSBA Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSBA Operations Center                                 |
| Weather Network Subscription                           | TO | NYSDOT Maintenance and Construction                     |
| Weather Network Subscription                           | TO | NYSTA Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSTA Statewide Operations Center                       |
| Weather Network Subscription                           | TO | TRANSCOM Operations Information Center                  |
| Weather Network Subscription                           | TO | HVTMC Freeway Management System                         |
| Weather Network Subscription                           | TO | Local Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSBA Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSBA Operations Center                                 |
| Weather Network Subscription                           | TO | NYSDOT Maintenance and Construction                     |
| Weather Network Subscription                           | TO | NYSTA Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSTA Statewide Operations Center                       |
| Weather Network Subscription                           | TO | TRANSCOM Operations Information Center                  |
| HVTMC Freeway Management System                        | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                        | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                        | TO | Weather Network Subscription                            |
| HVTMC Freeway Management System                        | TO | Weather Network Subscription                            |
| Local Maintenance and Construction                     | TO | Weather Network Subscription                            |
| Local Maintenance and Construction                     | TO | Weather Network Subscription                            |
| NYSBA Maintenance and Construction                     | TO | Weather Network Subscription                            |



|   |    |   |
|---|----|---|
| NYSBA Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSBA Operations Center                                 | TO | Weather Network Subscription                            |
| NYSBA Operations Center                                 | TO | Weather Network Subscription                            |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Maintenance and Construction                      |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Maintenance and Construction                      |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Operations Center                                 |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Operations Center                                 |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Satellite Operations Centers                      |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Satellite Operations Centers                      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction                     | TO | Weather Network Subscription                            |
| NYSDOT Maintenance and Construction                     | TO | Weather Network Subscription                            |
| NYSDOT RWIS Servers                                     | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                                     | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                      |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                      |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Maintenance and Construction                      |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Maintenance and Construction                      |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Statewide Operations Center                       | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Statewide Operations Center                       | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Statewide Operations Center                       | TO | Weather Network Subscription                            |
| NYSTA Statewide Operations Center                       | TO | Weather Network Subscription                            |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Maintenance and Construction                      |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Maintenance and Construction                      |

|  |    |   |
|--|----|---|
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                       |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                       |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System  |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                            |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                            |
| TRANSCOM Sensors and CCTV Equipment                    | TO | TRANSCOM Operations Information Center                  |
| TRANSCOM Sensors and CCTV Equipment                    | TO | TRANSCOM Operations Information Center                  |
| Weather Network Subscription                           | TO | HVTMC Freeway Management System                         |
| Weather Network Subscription                           | TO | HVTMC Freeway Management System                         |
| Weather Network Subscription                           | TO | Local Maintenance and Construction                      |
| Weather Network Subscription                           | TO | Local Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSBA Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSBA Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSBA Operations Center                                 |
| Weather Network Subscription                           | TO | NYSBA Operations Center                                 |
| Weather Network Subscription                           | TO | NYSDOT Maintenance and Construction                     |
| Weather Network Subscription                           | TO | NYSDOT Maintenance and Construction                     |
| Weather Network Subscription                           | TO | NYSTA Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSTA Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSTA Statewide Operations Center                       |
| Weather Network Subscription                           | TO | NYSTA Statewide Operations Center                       |
| Weather Network Subscription                           | TO | TRANSCOM Operations Information Center                  |
| Weather Network Subscription                           | TO | TRANSCOM Operations Information Center                  |
| HVTMC Freeway Management System                        | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                        | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                        | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                        | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                        | TO | Weather Network Subscription                            |
| HVTMC Freeway Management System                        | TO | Weather Network Subscription                            |
| HVTMC Freeway Management System                        | TO | Weather Network Subscription                            |
| HVTMC Freeway Management System                        | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                        | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                        | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                        | TO | Weather Network Subscription                            |
| HVTMC Freeway Management System                        | TO | Weather Network Subscription                            |
| HVTMC Freeway Management System                        | TO | Weather Network Subscription                            |
| HVTMC Freeway Management System                        | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                        | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                        | TO | NYSDOT Street Surface Weather Condition Modeling System |

|                                    |  |
|------------------------------------|--|
| HVTMC Freeway Management System    | TO Weather Network Subscription                            |
| HVTMC Freeway Management System    | TO Weather Network Subscription                            |
| HVTMC Freeway Management System    | TO Weather Network Subscription                            |
| HVTMC Freeway Management System    | TO NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System    | TO NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System    | TO NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System    | TO Weather Network Subscription                            |
| HVTMC Freeway Management System    | TO Weather Network Subscription                            |
| HVTMC Freeway Management System    | TO Weather Network Subscription                            |
| Local Maintenance and Construction | TO Weather Network Subscription                            |
| Local Maintenance and Construction | TO Weather Network Subscription                            |
| Local Maintenance and Construction | TO Weather Network Subscription                            |
| Local Maintenance and Construction | TO Weather Network Subscription                            |
| Local Maintenance and Construction | TO Weather Network Subscription                            |
| Local Maintenance and Construction | TO Weather Network Subscription                            |
| Local Maintenance and Construction | TO Weather Network Subscription                            |
| Local Maintenance and Construction | TO Weather Network Subscription                            |
| Local Maintenance and Construction | TO Weather Network Subscription                            |
| Local Maintenance and Construction | TO Weather Network Subscription                            |
| Local Maintenance and Construction | TO Weather Network Subscription                            |
| Local Maintenance and Construction | TO Weather Network Subscription                            |
| NYSBA Maintenance and Construction | TO Weather Network Subscription                            |
| NYSBA Maintenance and Construction | TO Weather Network Subscription                            |
| NYSBA Maintenance and Construction | TO Weather Network Subscription                            |
| NYSBA Maintenance and Construction | TO Weather Network Subscription                            |
| NYSBA Maintenance and Construction | TO Weather Network Subscription                            |
| NYSBA Maintenance and Construction | TO Weather Network Subscription                            |
| NYSBA Maintenance and Construction | TO Weather Network Subscription                            |
| NYSBA Maintenance and Construction | TO Weather Network Subscription                            |
| NYSBA Maintenance and Construction | TO Weather Network Subscription                            |
| NYSBA Maintenance and Construction | TO Weather Network Subscription                            |
| NYSBA Maintenance and Construction | TO Weather Network Subscription                            |
| NYSBA Maintenance and Construction | TO Weather Network Subscription                            |
| NYSBA Maintenance and Construction | TO Weather Network Subscription                            |
| NYSBA Operations Center            | TO Weather Network Subscription                            |
| NYSBA Operations Center            | TO Weather Network Subscription                            |
| NYSBA Operations Center            | TO Weather Network Subscription                            |
| NYSBA Operations Center            | TO Weather Network Subscription                            |
| NYSBA Operations Center            | TO Weather Network Subscription                            |
| NYSBA Operations Center            | TO Weather Network Subscription                            |
| NYSBA Operations Center            | TO Weather Network Subscription                            |
| NYSBA Operations Center            | TO Weather Network Subscription                            |
| NYSBA Operations Center            | TO Weather Network Subscription                            |
| NYSBA Operations Center            | TO Weather Network Subscription                            |
| NYSBA Operations Center            | TO Weather Network Subscription                            |
| NYSBA Operations Center            | TO Weather Network Subscription                            |
| NYSBA Operations Center            | TO Weather Network Subscription                            |
| NYSBA Sensors and CCTV Equipment   | TO NYSDOT Street Surface Weather Condition Modeling System |
| NYSBA Sensors and CCTV Equipment   | TO NYSDOT Street Surface Weather Condition Modeling System |
| NYSBA Sensors and CCTV Equipment   | TO NYSDOT Street Surface Weather Condition Modeling System |
| NYSBA Sensors and CCTV Equipment   | TO NYSDOT Street Surface Weather Condition Modeling System |



|                                     |    |   |
|-------------------------------------|----|---|
| NYSDOT Maintenance and Construction | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction | TO | Weather Network Subscription                            |
| NYSDOT Maintenance and Construction | TO | Weather Network Subscription                            |
| NYSDOT Maintenance and Construction | TO | Weather Network Subscription                            |
| NYSDOT Maintenance and Construction | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction | TO | Weather Network Subscription                            |
| NYSDOT Maintenance and Construction | TO | Weather Network Subscription                            |
| NYSDOT Maintenance and Construction | TO | Weather Network Subscription                            |
| NYSDOT RWIS Servers                 | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                 | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                 | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                 | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                 | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                 | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                 | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                 | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                 | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                 | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                 | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                 | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                 | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                 | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                 | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                 | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                 | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                 | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                 | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                 | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                 | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                 | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                 | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                 | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                 | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                 | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                 | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                 | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                 | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                 | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                 | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                 | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                 | TO | NYSDOT Maintenance and Construction                     |

|   |    |   |
|---|----|---|
| NYSDOT RWIS Servers                                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |

|   |    |  |
|---|----|--|
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                        |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                    |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                    |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                    |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                     |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                     |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                     |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                     |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                     |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                     |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                     |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                     |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                     |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                     |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                     |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                           |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                           |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                           |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                           |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                           |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                           |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                           |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                           |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                           |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                           |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                           |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                           |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Maintenance and Construction                     |

|                                   |   |
|-----------------------------------|---|
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Maintenance and Construction                     |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Maintenance and Construction                     |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Tarrytown Equipment Hub                          |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Tarrytown Equipment Hub                          |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Tarrytown Equipment Hub                          |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Maintenance and Construction                     |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Maintenance and Construction                     |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Maintenance and Construction                     |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Tarrytown Equipment Hub                          |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Tarrytown Equipment Hub                          |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Tarrytown Equipment Hub                          |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Tarrytown Equipment Hub                          |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Maintenance and Construction                     |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Maintenance and Construction                     |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Maintenance and Construction                     |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Tarrytown Equipment Hub                          |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Tarrytown Equipment Hub                          |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Tarrytown Equipment Hub                          |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Maintenance and Construction                     |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Maintenance and Construction                     |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Maintenance and Construction                     |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Tarrytown Equipment Hub                          |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Tarrytown Equipment Hub                          |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Tarrytown Equipment Hub                          |
| NYSTA Statewide Operations Center | TO NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Statewide Operations Center | TO NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Statewide Operations Center | TO NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Statewide Operations Center | TO Weather Network Subscription                           |
| NYSTA Statewide Operations Center | TO Weather Network Subscription                           |
| NYSTA Statewide Operations Center | TO Weather Network Subscription                           |
| NYSTA Statewide Operations Center | TO NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Statewide Operations Center | TO NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Statewide Operations Center | TO NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Statewide Operations Center | TO NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Statewide Operations Center | TO Weather Network Subscription                           |
| NYSTA Statewide Operations Center | TO Weather Network Subscription                           |
| NYSTA Statewide Operations Center | TO Weather Network Subscription                           |
| NYSTA Statewide Operations Center | TO NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Statewide Operations Center | TO NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Statewide Operations Center | TO NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Statewide Operations Center | TO NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Statewide Operations Center | TO Weather Network Subscription                           |
| NYSTA Statewide Operations Center | TO Weather Network Subscription                           |
| NYSTA Statewide Operations Center | TO Weather Network Subscription                           |
| NYSTA Statewide Operations Center | TO NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Statewide Operations Center | TO NYSTA Street Surface Weather Condition Modeling System |



|  |    |  |
|--|----|--|
| NYSTA Statewide Operations Center                      | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Statewide Operations Center                      | TO | Weather Network Subscription                           |
| NYSTA Statewide Operations Center                      | TO | Weather Network Subscription                           |
| NYSTA Statewide Operations Center                      | TO | Weather Network Subscription                           |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                     |

|  |    |  |
|--|----|--|
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                     |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                           |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                           |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                           |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                           |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                           |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                           |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                           |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                           |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                           |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                           |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                           |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                           |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                           |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                           |
| TRANSCOM Sensors and CCTV Equipment                    | TO | TRANSCOM Operations Information Center                 |
| TRANSCOM Sensors and CCTV Equipment                    | TO | TRANSCOM Operations Information Center                 |
| TRANSCOM Sensors and CCTV Equipment                    | TO | TRANSCOM Operations Information Center                 |
| TRANSCOM Sensors and CCTV Equipment                    | TO | TRANSCOM Operations Information Center                 |
| TRANSCOM Sensors and CCTV Equipment                    | TO | TRANSCOM Operations Information Center                 |

|                                     |    |  |
|-------------------------------------|----|--|
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| Weather Network Subscription        | TO | HVTMC Freeway Management System        |
| Weather Network Subscription        | TO | HVTMC Freeway Management System        |
| Weather Network Subscription        | TO | HVTMC Freeway Management System        |
| Weather Network Subscription        | TO | Local Maintenance and Construction     |
| Weather Network Subscription        | TO | Local Maintenance and Construction     |
| Weather Network Subscription        | TO | Local Maintenance and Construction     |
| Weather Network Subscription        | TO | NYSBA Maintenance and Construction     |
| Weather Network Subscription        | TO | NYSBA Maintenance and Construction     |
| Weather Network Subscription        | TO | NYSBA Maintenance and Construction     |
| Weather Network Subscription        | TO | NYSBA Operations Center                |
| Weather Network Subscription        | TO | NYSBA Operations Center                |
| Weather Network Subscription        | TO | NYSBA Operations Center                |
| Weather Network Subscription        | TO | NYSDOT Maintenance and Construction    |
| Weather Network Subscription        | TO | NYSDOT Maintenance and Construction    |
| Weather Network Subscription        | TO | NYSDOT Maintenance and Construction    |
| Weather Network Subscription        | TO | NYSTA Maintenance and Construction     |
| Weather Network Subscription        | TO | NYSTA Maintenance and Construction     |
| Weather Network Subscription        | TO | NYSTA Maintenance and Construction     |
| Weather Network Subscription        | TO | NYSTA Statewide Operations Center      |
| Weather Network Subscription        | TO | NYSTA Statewide Operations Center      |
| Weather Network Subscription        | TO | NYSTA Statewide Operations Center      |
| Weather Network Subscription        | TO | TRANSCOM Operations Information Center |
| Weather Network Subscription        | TO | TRANSCOM Operations Information Center |
| Weather Network Subscription        | TO | TRANSCOM Operations Information Center |
| Weather Network Subscription        | TO | HVTMC Freeway Management System        |
| Weather Network Subscription        | TO | HVTMC Freeway Management System        |
| Weather Network Subscription        | TO | HVTMC Freeway Management System        |
| Weather Network Subscription        | TO | Local Maintenance and Construction     |
| Weather Network Subscription        | TO | Local Maintenance and Construction     |
| Weather Network Subscription        | TO | Local Maintenance and Construction     |
| Weather Network Subscription        | TO | NYSBA Maintenance and Construction     |
| Weather Network Subscription        | TO | NYSBA Maintenance and Construction     |
| Weather Network Subscription        | TO | NYSBA Maintenance and Construction     |
| Weather Network Subscription        | TO | NYSBA Operations Center                |
| Weather Network Subscription        | TO | NYSBA Operations Center                |
| Weather Network Subscription        | TO | NYSBA Operations Center                |
| Weather Network Subscription        | TO | NYSDOT Maintenance and Construction    |
| Weather Network Subscription        | TO | NYSDOT Maintenance and Construction    |
| Weather Network Subscription        | TO | NYSDOT Maintenance and Construction    |
| Weather Network Subscription        | TO | NYSTA Maintenance and Construction     |
| Weather Network Subscription        | TO | NYSTA Maintenance and Construction     |
| Weather Network Subscription        | TO | NYSTA Maintenance and Construction     |
| Weather Network Subscription        | TO | NYSTA Statewide Operations Center      |
| Weather Network Subscription        | TO | NYSTA Statewide Operations Center      |
| Weather Network Subscription        | TO | NYSTA Statewide Operations Center      |

|                              |    |  |
|------------------------------|----|--|
| Weather Network Subscription | TO | TRANSCOM Operations Information Center |
| Weather Network Subscription | TO | TRANSCOM Operations Information Center |
| Weather Network Subscription | TO | TRANSCOM Operations Information Center |
| Weather Network Subscription | TO | HVTMC Freeway Management System        |
| Weather Network Subscription | TO | HVTMC Freeway Management System        |
| Weather Network Subscription | TO | HVTMC Freeway Management System        |
| Weather Network Subscription | TO | Local Maintenance and Construction     |
| Weather Network Subscription | TO | Local Maintenance and Construction     |
| Weather Network Subscription | TO | Local Maintenance and Construction     |
| Weather Network Subscription | TO | NYSBA Maintenance and Construction     |
| Weather Network Subscription | TO | NYSBA Maintenance and Construction     |
| Weather Network Subscription | TO | NYSBA Maintenance and Construction     |
| Weather Network Subscription | TO | NYSBA Operations Center                |
| Weather Network Subscription | TO | NYSBA Operations Center                |
| Weather Network Subscription | TO | NYSBA Operations Center                |
| Weather Network Subscription | TO | NYSDOT Maintenance and Construction    |
| Weather Network Subscription | TO | NYSDOT Maintenance and Construction    |
| Weather Network Subscription | TO | NYSDOT Maintenance and Construction    |
| Weather Network Subscription | TO | NYSTA Maintenance and Construction     |
| Weather Network Subscription | TO | NYSTA Maintenance and Construction     |
| Weather Network Subscription | TO | NYSTA Maintenance and Construction     |
| Weather Network Subscription | TO | NYSTA Statewide Operations Center      |
| Weather Network Subscription | TO | NYSTA Statewide Operations Center      |
| Weather Network Subscription | TO | NYSTA Statewide Operations Center      |
| Weather Network Subscription | TO | TRANSCOM Operations Information Center |
| Weather Network Subscription | TO | TRANSCOM Operations Information Center |
| Weather Network Subscription | TO | TRANSCOM Operations Information Center |
| Weather Network Subscription | TO | HVTMC Freeway Management System        |
| Weather Network Subscription | TO | HVTMC Freeway Management System        |
| Weather Network Subscription | TO | HVTMC Freeway Management System        |
| Weather Network Subscription | TO | Local Maintenance and Construction     |
| Weather Network Subscription | TO | Local Maintenance and Construction     |
| Weather Network Subscription | TO | Local Maintenance and Construction     |
| Weather Network Subscription | TO | NYSBA Maintenance and Construction     |
| Weather Network Subscription | TO | NYSBA Maintenance and Construction     |
| Weather Network Subscription | TO | NYSBA Maintenance and Construction     |
| Weather Network Subscription | TO | NYSBA Operations Center                |
| Weather Network Subscription | TO | NYSBA Operations Center                |
| Weather Network Subscription | TO | NYSBA Operations Center                |
| Weather Network Subscription | TO | NYSDOT Maintenance and Construction    |
| Weather Network Subscription | TO | NYSDOT Maintenance and Construction    |
| Weather Network Subscription | TO | NYSDOT Maintenance and Construction    |
| Weather Network Subscription | TO | NYSTA Maintenance and Construction     |
| Weather Network Subscription | TO | NYSTA Maintenance and Construction     |
| Weather Network Subscription | TO | NYSTA Maintenance and Construction     |
| Weather Network Subscription | TO | NYSTA Statewide Operations Center      |
| Weather Network Subscription | TO | NYSTA Statewide Operations Center      |
| Weather Network Subscription | TO | NYSTA Statewide Operations Center      |
| Weather Network Subscription | TO | TRANSCOM Operations Information Center |
| Weather Network Subscription | TO | TRANSCOM Operations Information Center |
| Weather Network Subscription | TO | TRANSCOM Operations Information Center |

|   |    |   |
|---|----|---|
| HVTMC Freeway Management System                         | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                         | TO | Weather Network Subscription                            |
| HVTMC Freeway Management System                         | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                         | TO | Weather Network Subscription                            |
| Local Maintenance and Construction                      | TO | Weather Network Subscription                            |
| Local Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSBA Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSBA Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSBA Operations Center                                 | TO | Weather Network Subscription                            |
| NYSBA Operations Center                                 | TO | Weather Network Subscription                            |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Maintenance and Construction                      |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Operations Center                                 |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Satellite Operations Centers                      |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Maintenance and Construction                      |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Operations Center                                 |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Satellite Operations Centers                      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction                     | TO | Weather Network Subscription                            |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction                     | TO | Weather Network Subscription                            |
| NYSDOT RWIS Servers                                     | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                                     | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                      |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                      |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Maintenance and Construction                      |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Maintenance and Construction                      |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Statewide Operations Center                       | TO | NYSTA Street Surface Weather Condition Modeling System  |

|  |    |   |
|--|----|---|
| NYSTA Statewide Operations Center                      | TO | Weather Network Subscription                            |
| NYSTA Statewide Operations Center                      | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Statewide Operations Center                      | TO | Weather Network Subscription                            |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                       |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction                      |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center                       |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Tarrytown Equipment Hub                          | TO | NYSTA Street Surface Weather Condition Modeling System  |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                            |
| TRANSCOM Operations Information Center                 | TO | Weather Network Subscription                            |
| TRANSCOM Sensors and CCTV Equipment                    | TO | TRANSCOM Operations Information Center                  |
| TRANSCOM Sensors and CCTV Equipment                    | TO | TRANSCOM Operations Information Center                  |
| Weather Network Subscription                           | TO | HVTMC Freeway Management System                         |
| Weather Network Subscription                           | TO | Local Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSBA Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSBA Operations Center                                 |
| Weather Network Subscription                           | TO | NYSDOT Maintenance and Construction                     |
| Weather Network Subscription                           | TO | NYSTA Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSTA Statewide Operations Center                       |
| Weather Network Subscription                           | TO | TRANSCOM Operations Information Center                  |
| Weather Network Subscription                           | TO | HVTMC Freeway Management System                         |
| Weather Network Subscription                           | TO | Local Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSBA Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSBA Operations Center                                 |
| Weather Network Subscription                           | TO | NYSDOT Maintenance and Construction                     |
| Weather Network Subscription                           | TO | NYSTA Maintenance and Construction                      |
| Weather Network Subscription                           | TO | NYSTA Statewide Operations Center                       |
| Weather Network Subscription                           | TO | TRANSCOM Operations Information Center                  |
| HVTMC Freeway Management System                        | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                        | TO | Weather Network Subscription                            |
| HVTMC Freeway Management System                        | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System                        | TO | Weather Network Subscription                            |
| Local Maintenance and Construction                     | TO | Weather Network Subscription                            |
| Local Maintenance and Construction                     | TO | Weather Network Subscription                            |
| NYSBA Maintenance and Construction                     | TO | Weather Network Subscription                            |
| NYSBA Maintenance and Construction                     | TO | Weather Network Subscription                            |
| NYSBA Operations Center                                | TO | Weather Network Subscription                            |
| NYSBA Operations Center                                | TO | Weather Network Subscription                            |
| NYSBA Sensors and CCTV Equipment                       | TO | NYSBA Maintenance and Construction                      |
| NYSBA Sensors and CCTV Equipment                       | TO | NYSBA Operations Center                                 |
| NYSBA Sensors and CCTV Equipment                       | TO | NYSBA Satellite Operations Centers                      |

|   |    |   |
|---|----|---|
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Maintenance and Construction                      |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Operations Center                                 |
| NYSBA Sensors and CCTV Equipment                        | TO | NYSBA Satellite Operations Centers                      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction                     | TO | Weather Network Subscription                            |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction                     | TO | Weather Network Subscription                            |
| NYSDOT RWIS Servers                                     | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                                     | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                      |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                      |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Maintenance and Construction                      |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Maintenance and Construction                      |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Statewide Operations Center                       | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Statewide Operations Center                       | TO | Weather Network Subscription                            |
| NYSTA Statewide Operations Center                       | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Statewide Operations Center                       | TO | Weather Network Subscription                            |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Maintenance and Construction                      |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Statewide Operations Center                       |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Maintenance and Construction                      |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Statewide Operations Center                       |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Tarrytown Equipment Hub                           |

|  |    |   |
|--|----|---|
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Street Surface Weather Condition Modeling System  |
| TRANSCOM Operations Information Center | TO | Weather Network Subscription                            |
| TRANSCOM Operations Information Center | TO | Weather Network Subscription                            |
| TRANSCOM Sensors and CCTV Equipment    | TO | TRANSCOM Operations Information Center                  |
| TRANSCOM Sensors and CCTV Equipment    | TO | TRANSCOM Operations Information Center                  |
| Weather Network Subscription           | TO | HVTMC Freeway Management System                         |
| Weather Network Subscription           | TO | Local Maintenance and Construction                      |
| Weather Network Subscription           | TO | NYSBA Maintenance and Construction                      |
| Weather Network Subscription           | TO | NYSBA Operations Center                                 |
| Weather Network Subscription           | TO | NYSDOT Maintenance and Construction                     |
| Weather Network Subscription           | TO | NYSTA Maintenance and Construction                      |
| Weather Network Subscription           | TO | NYSTA Statewide Operations Center                       |
| Weather Network Subscription           | TO | TRANSCOM Operations Information Center                  |
| Weather Network Subscription           | TO | HVTMC Freeway Management System                         |
| Weather Network Subscription           | TO | Local Maintenance and Construction                      |
| Weather Network Subscription           | TO | NYSBA Maintenance and Construction                      |
| Weather Network Subscription           | TO | NYSBA Operations Center                                 |
| Weather Network Subscription           | TO | NYSDOT Maintenance and Construction                     |
| Weather Network Subscription           | TO | NYSTA Maintenance and Construction                      |
| Weather Network Subscription           | TO | NYSTA Statewide Operations Center                       |
| Weather Network Subscription           | TO | TRANSCOM Operations Information Center                  |
| HVTMC Freeway Management System        | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System        | TO | Weather Network Subscription                            |
| HVTMC Freeway Management System        | TO | NYSDOT Street Surface Weather Condition Modeling System |
| HVTMC Freeway Management System        | TO | Weather Network Subscription                            |
| Local Maintenance and Construction     | TO | Weather Network Subscription                            |
| Local Maintenance and Construction     | TO | Weather Network Subscription                            |
| NYSBA Maintenance and Construction     | TO | Weather Network Subscription                            |
| NYSBA Maintenance and Construction     | TO | Weather Network Subscription                            |
| NYSBA Operations Center                | TO | Weather Network Subscription                            |
| NYSBA Operations Center                | TO | Weather Network Subscription                            |
| NYSBA Sensors and CCTV Equipment       | TO | NYSBA Maintenance and Construction                      |
| NYSBA Sensors and CCTV Equipment       | TO | NYSBA Operations Center                                 |
| NYSBA Sensors and CCTV Equipment       | TO | NYSBA Satellite Operations Centers                      |
| NYSBA Sensors and CCTV Equipment       | TO | NYSBA Maintenance and Construction                      |
| NYSBA Sensors and CCTV Equipment       | TO | NYSBA Operations Center                                 |
| NYSBA Sensors and CCTV Equipment       | TO | NYSBA Satellite Operations Centers                      |
| NYSDOT Maintenance and Construction    | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction    | TO | Weather Network Subscription                            |
| NYSDOT Maintenance and Construction    | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction    | TO | Weather Network Subscription                            |
| NYSDOT RWIS Servers                    | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                    | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT RWIS Servers                    | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT RWIS Servers                    | TO | HVTMC Freeway Management System                         |
| NYSDOT RWIS Servers                    | TO | NYSDOT Maintenance and Construction                     |



|   |    |   |
|---|----|---|
| NYSDOT RWIS Servers                                     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Sensors and CCTV Equipment                       | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System                         |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction                     |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                      |
| NYSTA DSRC Equipment                                    | TO | NYSTA Maintenance and Construction                      |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSTA Maintenance and Construction                      | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction                      | TO | Weather Network Subscription                            |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Maintenance and Construction                      |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Maintenance and Construction                      |
| NYSTA Sensors and CCTV Equipment                        | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Statewide Operations Center                       | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Statewide Operations Center                       | TO | Weather Network Subscription                            |
| NYSTA Statewide Operations Center                       | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Statewide Operations Center                       | TO | Weather Network Subscription                            |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Maintenance and Construction                      |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Statewide Operations Center                       |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Maintenance and Construction                      |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Statewide Operations Center                       |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Tarrytown Equipment Hub                           |
| NYSTA Tarrytown Equipment Hub                           | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Tarrytown Equipment Hub                           | TO | NYSTA Street Surface Weather Condition Modeling System  |
| TRANSCOM Operations Information Center                  | TO | Weather Network Subscription                            |
| TRANSCOM Operations Information Center                  | TO | Weather Network Subscription                            |
| TRANSCOM Sensors and CCTV Equipment                     | TO | TRANSCOM Operations Information Center                  |
| TRANSCOM Sensors and CCTV Equipment                     | TO | TRANSCOM Operations Information Center                  |
| Weather Network Subscription                            | TO | HVTMC Freeway Management System                         |
| Weather Network Subscription                            | TO | Local Maintenance and Construction                      |
| Weather Network Subscription                            | TO | NYSBA Maintenance and Construction                      |
| Weather Network Subscription                            | TO | NYSBA Operations Center                                 |
| Weather Network Subscription                            | TO | NYSDOT Maintenance and Construction                     |
| Weather Network Subscription                            | TO | NYSTA Maintenance and Construction                      |
| Weather Network Subscription                            | TO | NYSTA Statewide Operations Center                       |

|                              |    |  |
|------------------------------|----|--|
| Weather Network Subscription | TO | TRANSCOM Operations Information Center |
| Weather Network Subscription | TO | HVTMC Freeway Management System        |
| Weather Network Subscription | TO | Local Maintenance and Construction     |
| Weather Network Subscription | TO | NYSBA Maintenance and Construction     |
| Weather Network Subscription | TO | NYSBA Operations Center                |
| Weather Network Subscription | TO | NYSDOT Maintenance and Construction    |
| Weather Network Subscription | TO | NYSTA Maintenance and Construction     |
| Weather Network Subscription | TO | NYSTA Statewide Operations Center      |
| Weather Network Subscription | TO | TRANSCOM Operations Information Center |

**Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Object Definitions for Environmental Sensor Stations & Roadside Weather Information System (Data Dictionary, Message Set )

(ASTM) Standard Specification for 5.9 GHz Data Link Layer (Communications Protocol)

(ASTM) Standard Specification for 5.9 GHz Physical Layer (Communications Protocol)

## Architecture Flow

environmental probe data

### Roadway Subsystem To Traffic Management

#### **Inventory**

|  |    |  |
|--|----|--|
| Bee-Line Bus Vehicles IT Equipment           | TO | Bee-Line Bus Operations Dispatch System            |
| Bee-Line Bus Vehicles IT Equipment           | TO | Bee-Line Bus Operations Dispatch System            |
| Bee-Line Bus Vehicles IT Equipment           | TO | Bee-Line Bus Operations Dispatch System            |
| Bridge Authority Maintenance Vehicles        | TO | NYSBA Maintenance and Construction                 |
| Bridge Authority Maintenance Vehicles        | TO | NYSBA Maintenance and Construction                 |
| Bridge Authority Maintenance Vehicles        | TO | NYSBA Maintenance and Construction                 |
| Dutchess LOOP Bus Vehicles IT Equipment      | TO | Dutchess LOOP Bus Dispatch System                  |
| Dutchess LOOP Bus Vehicles IT Equipment      | TO | Dutchess LOOP Bus Dispatch System                  |
| Dutchess LOOP Bus Vehicles IT Equipment      | TO | Dutchess LOOP Bus Dispatch System                  |
| Local Emergency Vehicles (Fire, EMS, Police) | TO | Local Emergency Dispatch                           |
| Local Emergency Vehicles (Fire, EMS, Police) | TO | Local Emergency Dispatch                           |
| Local Emergency Vehicles (Fire, EMS, Police) | TO | Local Emergency Dispatch                           |
| Local Road Maintenance Vehicles              | TO | Local Maintenance and Construction                 |
| Local Road Maintenance Vehicles              | TO | Local Maintenance and Construction                 |
| Local Road Maintenance Vehicles              | TO | Local Maintenance and Construction                 |
| NYSBA Sensors and CCTV Equipment             | TO | NYSBA Satellite Operations Centers                 |
| NYSBA Sensors and CCTV Equipment             | TO | NYSBA Satellite Operations Centers                 |
| NYSBA Sensors and CCTV Equipment             | TO | NYSBA Satellite Operations Centers                 |
| NYSDOT Road Maintenance Vehicles             | TO | NYSDOT Maintenance and Construction                |
| NYSDOT Road Maintenance Vehicles             | TO | NYSDOT Maintenance and Construction                |
| NYSDOT Road Maintenance Vehicles             | TO | NYSDOT Maintenance and Construction                |
| NYSDOT Sensors and CCTV Equipment            | TO | HVTMC Freeway Management System                    |
| NYSDOT Sensors and CCTV Equipment            | TO | HVTMC Freeway Management System                    |
| NYSDOT Sensors and CCTV Equipment            | TO | HVTMC Freeway Management System                    |
| NYSP Vehicles                                | TO | NYSP Central Communication/Dispatch                |
| NYSP Vehicles                                | TO | NYSP Central Communication/Dispatch                |
| NYSP Vehicles                                | TO | NYSP Central Communication/Dispatch                |
| NYSTA DSRC Receiving Equipment               | TO | NYSTA DSRC Equipment                               |
| NYSTA DSRC Receiving Equipment               | TO | NYSTA DSRC Equipment                               |
| NYSTA DSRC Receiving Equipment               | TO | NYSTA DSRC Equipment                               |
| PART Bus Vehicles IT Equipment               | TO | PART Bus System                                    |
| PART Bus Vehicles IT Equipment               | TO | PART Bus System                                    |
| PART Bus Vehicles IT Equipment               | TO | PART Bus System                                    |
| Privatized ISP Interface                     | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                     | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                     | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                     | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                     | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                     | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                     | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                     | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                     | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                     | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                     | TO | SATIN (Service Area Travelers Interactive Network) |

|  |    |  |
|--|----|--|
| Privatized ISP Interface               | TO | SATIN (Service Area Travelers Interactive Network) |
| Rockland TOR Bus Vehicles IT Equipment | TO | Rockland TOR                                       |
| Rockland TOR Bus Vehicles IT Equipment | TO | Rockland TOR                                       |
| Rockland TOR Bus Vehicles IT Equipment | TO | Rockland TOR                                       |
| TRANSCOM Sensors and CCTV Equipment    | TO | TRANSCOM Operations Information Center             |
| TRANSCOM Sensors and CCTV Equipment    | TO | TRANSCOM Operations Information Center             |
| TRANSCOM Sensors and CCTV Equipment    | TO | TRANSCOM Operations Information Center             |

**Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Object Definitions for Environmental Sensor Stations & Roadside Weather Information System (Data Dictionary, Message Set )

## Architecture Flow

environmental sensors control

Maintenance and Construction Management To Roadway Subsystem

### **Inventory**

|   |    |                                       |
|---|----|---------------------------------------|
| HVTMC Freeway Management System                         | TO | NYSDOT RWIS Servers                   |
| HVTMC Freeway Management System                         | TO | NYSDOT RWIS Servers                   |
| HVTMC Freeway Management System                         | TO | NYSDOT RWIS Servers                   |
| HVTMC Freeway Management System                         | TO | NYSDOT Sensors and CCTV Equipment     |
| HVTMC Freeway Management System                         | TO | NYSDOT Sensors and CCTV Equipment     |
| HVTMC Freeway Management System                         | TO | NYSDOT Sensors and CCTV Equipment     |
| Local Maintenance and Construction                      | TO | Local Road Maintenance Vehicles       |
| Local Maintenance and Construction                      | TO | Local Road Maintenance Vehicles       |
| Local Maintenance and Construction                      | TO | Local Road Maintenance Vehicles       |
| NYSBA Maintenance and Construction                      | TO | Bridge Authority Maintenance Vehicles |
| NYSBA Maintenance and Construction                      | TO | Bridge Authority Maintenance Vehicles |
| NYSBA Maintenance and Construction                      | TO | Bridge Authority Maintenance Vehicles |
| NYSBA Maintenance and Construction                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Maintenance and Construction                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Maintenance and Construction                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Operations Center                                 | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Operations Center                                 | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Operations Center                                 | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Satellite Operations Centers                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Satellite Operations Centers                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Satellite Operations Centers                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Road Maintenance Vehicles      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Road Maintenance Vehicles      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Road Maintenance Vehicles      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT RWIS Servers                   |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT RWIS Servers                   |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT RWIS Servers                   |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT RWIS Servers                   |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT RWIS Servers                   |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT RWIS Servers                   |
| NYSTA Maintenance and Construction                      | TO | NYSTA DSRC Equipment                  |
| NYSTA Maintenance and Construction                      | TO | NYSTA DSRC Equipment                  |
| NYSTA Maintenance and Construction                      | TO | NYSTA DSRC Equipment                  |
| NYSTA Maintenance and Construction                      | TO | NYSTA Road Maintenance Vehicles       |
| NYSTA Maintenance and Construction                      | TO | NYSTA Road Maintenance Vehicles       |
| NYSTA Maintenance and Construction                      | TO | NYSTA Road Maintenance Vehicles       |
| NYSTA Maintenance and Construction                      | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Maintenance and Construction                      | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Maintenance and Construction                      | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Statewide Operations Center                       | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Statewide Operations Center                       | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Statewide Operations Center                       | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Tarrytown Equipment Hub                           | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Tarrytown Equipment Hub                           | TO | NYSTA Sensors and CCTV Equipment      |

|   |    |                                       |
|---|----|---------------------------------------|
| NYSTA Tarrytown Equipment Hub                           | TO | NYSTA Sensors and CCTV Equipment      |
| TRANSCOM Operations Information Center                  | TO | TRANSCOM Sensors and CCTV Equipment   |
| TRANSCOM Operations Information Center                  | TO | TRANSCOM Sensors and CCTV Equipment   |
| TRANSCOM Operations Information Center                  | TO | TRANSCOM Sensors and CCTV Equipment   |
| HVTMC Freeway Management System                         | TO | NYSDOT RWIS Servers                   |
| HVTMC Freeway Management System                         | TO | NYSDOT RWIS Servers                   |
| HVTMC Freeway Management System                         | TO | NYSDOT RWIS Servers                   |
| HVTMC Freeway Management System                         | TO | NYSDOT Sensors and CCTV Equipment     |
| HVTMC Freeway Management System                         | TO | NYSDOT Sensors and CCTV Equipment     |
| HVTMC Freeway Management System                         | TO | NYSDOT Sensors and CCTV Equipment     |
| Local Maintenance and Construction                      | TO | Local Road Maintenance Vehicles       |
| Local Maintenance and Construction                      | TO | Local Road Maintenance Vehicles       |
| Local Maintenance and Construction                      | TO | Local Road Maintenance Vehicles       |
| NYSBA Maintenance and Construction                      | TO | Bridge Authority Maintenance Vehicles |
| NYSBA Maintenance and Construction                      | TO | Bridge Authority Maintenance Vehicles |
| NYSBA Maintenance and Construction                      | TO | Bridge Authority Maintenance Vehicles |
| NYSBA Maintenance and Construction                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Maintenance and Construction                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Maintenance and Construction                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Operations Center                                 | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Operations Center                                 | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Operations Center                                 | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Satellite Operations Centers                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Satellite Operations Centers                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Satellite Operations Centers                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Satellite Operations Centers                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Road Maintenance Vehicles      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Road Maintenance Vehicles      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Road Maintenance Vehicles      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT RWIS Servers                   |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT RWIS Servers                   |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT RWIS Servers                   |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT RWIS Servers                   |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT RWIS Servers                   |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT RWIS Servers                   |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT RWIS Servers                   |
| NYSTA Maintenance and Construction                      | TO | NYSTA DSRC Equipment                  |
| NYSTA Maintenance and Construction                      | TO | NYSTA DSRC Equipment                  |
| NYSTA Maintenance and Construction                      | TO | NYSTA DSRC Equipment                  |
| NYSTA Maintenance and Construction                      | TO | NYSTA Road Maintenance Vehicles       |
| NYSTA Maintenance and Construction                      | TO | NYSTA Road Maintenance Vehicles       |
| NYSTA Maintenance and Construction                      | TO | NYSTA Road Maintenance Vehicles       |
| NYSTA Maintenance and Construction                      | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Maintenance and Construction                      | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Maintenance and Construction                      | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Statewide Operations Center                       | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Statewide Operations Center                       | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Statewide Operations Center                       | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Tarrytown Equipment Hub                           | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Tarrytown Equipment Hub                           | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Tarrytown Equipment Hub                           | TO | NYSTA Sensors and CCTV Equipment      |

|   |    |                                       |
|---|----|---------------------------------------|
| TRANSCOM Operations Information Center                  | TO | TRANSCOM Sensors and CCTV Equipment   |
| TRANSCOM Operations Information Center                  | TO | TRANSCOM Sensors and CCTV Equipment   |
| TRANSCOM Operations Information Center                  | TO | TRANSCOM Sensors and CCTV Equipment   |
| HVTMC Freeway Management System                         | TO | NYSDOT RWIS Servers                   |
| HVTMC Freeway Management System                         | TO | NYSDOT RWIS Servers                   |
| HVTMC Freeway Management System                         | TO | NYSDOT RWIS Servers                   |
| HVTMC Freeway Management System                         | TO | NYSDOT Sensors and CCTV Equipment     |
| HVTMC Freeway Management System                         | TO | NYSDOT Sensors and CCTV Equipment     |
| HVTMC Freeway Management System                         | TO | NYSDOT Sensors and CCTV Equipment     |
| Local Maintenance and Construction                      | TO | Local Road Maintenance Vehicles       |
| Local Maintenance and Construction                      | TO | Local Road Maintenance Vehicles       |
| Local Maintenance and Construction                      | TO | Local Road Maintenance Vehicles       |
| NYSBA Maintenance and Construction                      | TO | Bridge Authority Maintenance Vehicles |
| NYSBA Maintenance and Construction                      | TO | Bridge Authority Maintenance Vehicles |
| NYSBA Maintenance and Construction                      | TO | Bridge Authority Maintenance Vehicles |
| NYSBA Maintenance and Construction                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Maintenance and Construction                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Maintenance and Construction                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Operations Center                                 | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Operations Center                                 | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Operations Center                                 | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Satellite Operations Centers                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Satellite Operations Centers                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Satellite Operations Centers                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Road Maintenance Vehicles      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Road Maintenance Vehicles      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Road Maintenance Vehicles      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT RWIS Servers                   |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT RWIS Servers                   |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT RWIS Servers                   |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT RWIS Servers                   |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT RWIS Servers                   |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT RWIS Servers                   |
| NYSTA Maintenance and Construction                      | TO | NYSTA DSRC Equipment                  |
| NYSTA Maintenance and Construction                      | TO | NYSTA DSRC Equipment                  |
| NYSTA Maintenance and Construction                      | TO | NYSTA DSRC Equipment                  |
| NYSTA Maintenance and Construction                      | TO | NYSTA Road Maintenance Vehicles       |
| NYSTA Maintenance and Construction                      | TO | NYSTA Road Maintenance Vehicles       |
| NYSTA Maintenance and Construction                      | TO | NYSTA Road Maintenance Vehicles       |
| NYSTA Maintenance and Construction                      | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Maintenance and Construction                      | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Maintenance and Construction                      | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Statewide Operations Center                       | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Statewide Operations Center                       | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Statewide Operations Center                       | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Tarrytown Equipment Hub                           | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Tarrytown Equipment Hub                           | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Tarrytown Equipment Hub                           | TO | NYSTA Sensors and CCTV Equipment      |
| TRANSCOM Operations Information Center                  | TO | TRANSCOM Sensors and CCTV Equipment   |

|   |    |                                       |
|---|----|---------------------------------------|
| TRANSCOM Operations Information Center                  | TO | TRANSCOM Sensors and CCTV Equipment   |
| TRANSCOM Operations Information Center                  | TO | TRANSCOM Sensors and CCTV Equipment   |
| HVTMC Freeway Management System                         | TO | NYSDOT RWIS Servers                   |
| HVTMC Freeway Management System                         | TO | NYSDOT RWIS Servers                   |
| HVTMC Freeway Management System                         | TO | NYSDOT RWIS Servers                   |
| HVTMC Freeway Management System                         | TO | NYSDOT Sensors and CCTV Equipment     |
| HVTMC Freeway Management System                         | TO | NYSDOT Sensors and CCTV Equipment     |
| HVTMC Freeway Management System                         | TO | NYSDOT Sensors and CCTV Equipment     |
| Local Maintenance and Construction                      | TO | Local Road Maintenance Vehicles       |
| Local Maintenance and Construction                      | TO | Local Road Maintenance Vehicles       |
| Local Maintenance and Construction                      | TO | Local Road Maintenance Vehicles       |
| NYSBA Maintenance and Construction                      | TO | Bridge Authority Maintenance Vehicles |
| NYSBA Maintenance and Construction                      | TO | Bridge Authority Maintenance Vehicles |
| NYSBA Maintenance and Construction                      | TO | Bridge Authority Maintenance Vehicles |
| NYSBA Maintenance and Construction                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Maintenance and Construction                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Maintenance and Construction                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Operations Center                                 | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Operations Center                                 | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Operations Center                                 | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Satellite Operations Centers                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Satellite Operations Centers                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSBA Satellite Operations Centers                      | TO | NYSBA Sensors and CCTV Equipment      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Road Maintenance Vehicles      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Road Maintenance Vehicles      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT Road Maintenance Vehicles      |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT RWIS Servers                   |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT RWIS Servers                   |
| NYSDOT Maintenance and Construction                     | TO | NYSDOT RWIS Servers                   |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT RWIS Servers                   |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT RWIS Servers                   |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT RWIS Servers                   |
| NYSTA Maintenance and Construction                      | TO | NYSTA DSRC Equipment                  |
| NYSTA Maintenance and Construction                      | TO | NYSTA DSRC Equipment                  |
| NYSTA Maintenance and Construction                      | TO | NYSTA DSRC Equipment                  |
| NYSTA Maintenance and Construction                      | TO | NYSTA Road Maintenance Vehicles       |
| NYSTA Maintenance and Construction                      | TO | NYSTA Road Maintenance Vehicles       |
| NYSTA Maintenance and Construction                      | TO | NYSTA Road Maintenance Vehicles       |
| NYSTA Maintenance and Construction                      | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Maintenance and Construction                      | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Maintenance and Construction                      | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Statewide Operations Center                       | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Statewide Operations Center                       | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Statewide Operations Center                       | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Tarrytown Equipment Hub                           | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Tarrytown Equipment Hub                           | TO | NYSTA Sensors and CCTV Equipment      |
| NYSTA Tarrytown Equipment Hub                           | TO | NYSTA Sensors and CCTV Equipment      |
| TRANSCOM Operations Information Center                  | TO | TRANSCOM Sensors and CCTV Equipment   |
| TRANSCOM Operations Information Center                  | TO | TRANSCOM Sensors and CCTV Equipment   |



**Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Object Definitions for Environmental Sensor Stations & Roadside Weather Information System (Data Dictionary, Message Set )

**Architecture Flow**

equipment availability

Storage Facility To Maintenance and Construction Management

**Inventory**

|                                |    |                                     |
|--------------------------------|----|-------------------------------------|
| Local Maint. Storage Facility  | TO | Local Maintenance and Construction  |
| NYSBA Maint. Storage Facility  | TO | NYSBA Maintenance and Construction  |
| NYSDOT Maint. Storage Facility | TO | NYSDOT Maintenance and Construction |
| NYSTA Maint. Storage Facility  | TO | NYSTA Maintenance and Construction  |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

equipment maintenance status

Maintenance and Construction Management To Traffic Management

**Inventory**

|                                     |    |                                    |
|-------------------------------------|----|------------------------------------|
| Local Maintenance and Construction  | TO | HVTMC Freeway Management System    |
| NYSBA Maintenance and Construction  | TO | NYSBA Operations Center            |
| NYSBA Maintenance and Construction  | TO | NYSBA Satellite Operations Centers |
| NYSDOT Maintenance and Construction | TO | HVTMC Freeway Management System    |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center  |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub      |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

## Architecture Flow

event confirmation

Emergency Management To Event Promoters

### **Inventory**

|                                       |    |                                      |
|---------------------------------------|----|--------------------------------------|
| HVTMC Freeway Management System       | TO | Special Event Sponsors and Promoters |
| HVTMC Freeway Management System       | TO | Special Event Sponsors and Promoters |
| HVTMC Freeway Management System       | TO | Special Event Sponsors and Promoters |
| Local Emergency Dispatch              | TO | Special Event Sponsors and Promoters |
| Local Emergency Dispatch              | TO | Special Event Sponsors and Promoters |
| Local Emergency Dispatch              | TO | Special Event Sponsors and Promoters |
| NYSBA Operations Center               | TO | Special Event Sponsors and Promoters |
| NYSBA Operations Center               | TO | Special Event Sponsors and Promoters |
| NYSBA Operations Center               | TO | Special Event Sponsors and Promoters |
| NYSP Central Communication/Dispatch   | TO | Special Event Sponsors and Promoters |
| NYSP Central Communication/Dispatch   | TO | Special Event Sponsors and Promoters |
| NYSP Central Communication/Dispatch   | TO | Special Event Sponsors and Promoters |
| NYSTA Central Communications/Dispatch | TO | Special Event Sponsors and Promoters |
| NYSTA Central Communications/Dispatch | TO | Special Event Sponsors and Promoters |
| NYSTA Central Communications/Dispatch | TO | Special Event Sponsors and Promoters |
| NYSTA Statewide Operations Center     | TO | Special Event Sponsors and Promoters |
| NYSTA Statewide Operations Center     | TO | Special Event Sponsors and Promoters |
| NYSTA Statewide Operations Center     | TO | Special Event Sponsors and Promoters |
| HVTMC Freeway Management System       | TO | Special Event Sponsors and Promoters |
| HVTMC Freeway Management System       | TO | Special Event Sponsors and Promoters |
| HVTMC Freeway Management System       | TO | Special Event Sponsors and Promoters |
| Local Emergency Dispatch              | TO | Special Event Sponsors and Promoters |
| Local Emergency Dispatch              | TO | Special Event Sponsors and Promoters |
| Local Emergency Dispatch              | TO | Special Event Sponsors and Promoters |
| NYSBA Operations Center               | TO | Special Event Sponsors and Promoters |
| NYSBA Operations Center               | TO | Special Event Sponsors and Promoters |
| NYSBA Operations Center               | TO | Special Event Sponsors and Promoters |
| NYSP Central Communication/Dispatch   | TO | Special Event Sponsors and Promoters |
| NYSP Central Communication/Dispatch   | TO | Special Event Sponsors and Promoters |
| NYSP Central Communication/Dispatch   | TO | Special Event Sponsors and Promoters |
| NYSTA Central Communications/Dispatch | TO | Special Event Sponsors and Promoters |
| NYSTA Central Communications/Dispatch | TO | Special Event Sponsors and Promoters |
| NYSTA Central Communications/Dispatch | TO | Special Event Sponsors and Promoters |
| NYSTA Statewide Operations Center     | TO | Special Event Sponsors and Promoters |
| NYSTA Statewide Operations Center     | TO | Special Event Sponsors and Promoters |
| NYSTA Statewide Operations Center     | TO | Special Event Sponsors and Promoters |

## Standards

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Common Incident Management Message Sets (IMMS) for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

## Architecture Flow

event information

Event Promoters To Information Service Provider

### **Inventory**

|                                      |    |  |
|--------------------------------------|----|--|
| Special Event Sponsors and Promoters | TO | HVTMC ITS Information Service Provider |
| Special Event Sponsors and Promoters | TO | HVTMC ITS Information Service Provider |
| Special Event Sponsors and Promoters | TO | HVTMC ITS Information Service Provider |
| Special Event Sponsors and Promoters | TO | HVTMC ITS Information Service Provider |
| Special Event Sponsors and Promoters | TO | HVTMC ITS Information Service Provider |
| Special Event Sponsors and Promoters | TO | NYSBA ITS Information Service Provider |
| Special Event Sponsors and Promoters | TO | NYSBA ITS Information Service Provider |
| Special Event Sponsors and Promoters | TO | NYSBA ITS Information Service Provider |
| Special Event Sponsors and Promoters | TO | NYSBA ITS Information Service Provider |
| Special Event Sponsors and Promoters | TO | NYSBA ITS Information Service Provider |
| Special Event Sponsors and Promoters | TO | NYSBA ITS Information Service Provider |
| Special Event Sponsors and Promoters | TO | NYSTA ITS Information Service Provider |
| Special Event Sponsors and Promoters | TO | NYSTA ITS Information Service Provider |
| Special Event Sponsors and Promoters | TO | NYSTA ITS Information Service Provider |
| Special Event Sponsors and Promoters | TO | NYSTA ITS Information Service Provider |
| Special Event Sponsors and Promoters | TO | NYSTA ITS Information Service Provider |

## Standards

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

event information request

Information Service Provider To Event Promoters

### **Inventory**

|  |    |                                      |
|--|----|--------------------------------------|
| HVTMC ITS Information Service Provider | TO | Special Event Sponsors and Promoters |
| HVTMC ITS Information Service Provider | TO | Special Event Sponsors and Promoters |
| HVTMC ITS Information Service Provider | TO | Special Event Sponsors and Promoters |
| HVTMC ITS Information Service Provider | TO | Special Event Sponsors and Promoters |
| HVTMC ITS Information Service Provider | TO | Special Event Sponsors and Promoters |
| NYSBA ITS Information Service Provider | TO | Special Event Sponsors and Promoters |
| NYSBA ITS Information Service Provider | TO | Special Event Sponsors and Promoters |
| NYSBA ITS Information Service Provider | TO | Special Event Sponsors and Promoters |
| NYSBA ITS Information Service Provider | TO | Special Event Sponsors and Promoters |
| NYSBA ITS Information Service Provider | TO | Special Event Sponsors and Promoters |
| NYSTA ITS Information Service Provider | TO | Special Event Sponsors and Promoters |
| NYSTA ITS Information Service Provider | TO | Special Event Sponsors and Promoters |
| NYSTA ITS Information Service Provider | TO | Special Event Sponsors and Promoters |
| NYSTA ITS Information Service Provider | TO | Special Event Sponsors and Promoters |
| NYSTA ITS Information Service Provider | TO | Special Event Sponsors and Promoters |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

event plans

Event Promoters To Emergency Management

### **Inventory**

|                                      |    |                                       |
|--------------------------------------|----|---------------------------------------|
| Special Event Sponsors and Promoters | TO | HVTMC Freeway Management System       |
| Special Event Sponsors and Promoters | TO | HVTMC Freeway Management System       |
| Special Event Sponsors and Promoters | TO | HVTMC Freeway Management System       |
| Special Event Sponsors and Promoters | TO | Local Emergency Dispatch              |
| Special Event Sponsors and Promoters | TO | Local Emergency Dispatch              |
| Special Event Sponsors and Promoters | TO | Local Emergency Dispatch              |
| Special Event Sponsors and Promoters | TO | NYSBA Operations Center               |
| Special Event Sponsors and Promoters | TO | NYSBA Operations Center               |
| Special Event Sponsors and Promoters | TO | NYSBA Operations Center               |
| Special Event Sponsors and Promoters | TO | NYSP Central Communication/Dispatch   |
| Special Event Sponsors and Promoters | TO | NYSP Central Communication/Dispatch   |
| Special Event Sponsors and Promoters | TO | NYSP Central Communication/Dispatch   |
| Special Event Sponsors and Promoters | TO | NYSTA Central Communications/Dispatch |
| Special Event Sponsors and Promoters | TO | NYSTA Central Communications/Dispatch |
| Special Event Sponsors and Promoters | TO | NYSTA Central Communications/Dispatch |
| Special Event Sponsors and Promoters | TO | NYSTA Statewide Operations Center     |
| Special Event Sponsors and Promoters | TO | NYSTA Statewide Operations Center     |
| Special Event Sponsors and Promoters | TO | NYSTA Statewide Operations Center     |
| Special Event Sponsors and Promoters | TO | HVTMC Freeway Management System       |
| Special Event Sponsors and Promoters | TO | HVTMC Freeway Management System       |
| Special Event Sponsors and Promoters | TO | HVTMC Freeway Management System       |
| Special Event Sponsors and Promoters | TO | Local Emergency Dispatch              |
| Special Event Sponsors and Promoters | TO | Local Emergency Dispatch              |
| Special Event Sponsors and Promoters | TO | Local Emergency Dispatch              |
| Special Event Sponsors and Promoters | TO | NYSBA Operations Center               |
| Special Event Sponsors and Promoters | TO | NYSBA Operations Center               |
| Special Event Sponsors and Promoters | TO | NYSBA Operations Center               |
| Special Event Sponsors and Promoters | TO | NYSP Central Communication/Dispatch   |
| Special Event Sponsors and Promoters | TO | NYSP Central Communication/Dispatch   |
| Special Event Sponsors and Promoters | TO | NYSP Central Communication/Dispatch   |
| Special Event Sponsors and Promoters | TO | NYSTA Central Communications/Dispatch |
| Special Event Sponsors and Promoters | TO | NYSTA Central Communications/Dispatch |
| Special Event Sponsors and Promoters | TO | NYSTA Central Communications/Dispatch |
| Special Event Sponsors and Promoters | TO | NYSTA Statewide Operations Center     |
| Special Event Sponsors and Promoters | TO | NYSTA Statewide Operations Center     |
| Special Event Sponsors and Promoters | TO | NYSTA Statewide Operations Center     |

## **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Common Incident Management Message Sets (IMMS) for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

## **Architecture Flow**

external reports

Media To Information Service Provider

## **Inventory**

|   |    |  |
|---|----|--|
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System        |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center      |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System        |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center      |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center |

## **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

## Architecture Flow

fare and payment status

Transit Vehicle Subsystem To Transit Management

### **Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Vehicles Communications Equipment          | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment                      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Para Transit Vehicles Communications Equipment | TO | Bee-Line Bus Operations Dispatch System   |
| Dutchess LOOP Bus Vehicles Communications Equipment     | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment                 | TO | Dutchess LOOP Bus Dispatch System         |
| Metro North Rail Vehicles Communications Equipment      | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment                  | TO | Metro North Rail Operation Control Center |
| PART Bus Vehicles Communications Equipment              | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment                          | TO | PART Bus System                           |
| Rockland TOR Bus Vehicles Communications Equipment      | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment                  | TO | Rockland TOR                              |

### **Standards**

(AASHTO/ITE/NEMA) TCIP - Fare Collection (FC) Business Area Standard (Data Dictionary, Message Set )

## Architecture Flow

fare and price information

Information Service Provider To Traffic Management

### **Inventory**

|  |    |  |
|--|----|--|
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |



|  |    |  |
|--|----|--|
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

**Architecture Flow**

fare management information

Transit Management To Transit Vehicle Subsystem

**Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles Communications Equipment     |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles IT Equipment                 |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles Communications Equipment      |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles IT Equipment                  |
| PART Bus System                           | TO | PART Bus Vehicles Communications Equipment              |
| PART Bus System                           | TO | PART Bus Vehicles IT Equipment                          |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles Communications Equipment      |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles IT Equipment                  |

**Standards**

(AASHTO/ITE/NEMA) TCIP - Fare Collection (FC) Business Area Standard (Data Dictionary, Message Set )

## Architecture Flow

field device status

Roadway Subsystem To Maintenance and Construction Management

### **Inventory**

|  |    |                                     |
|--|----|-------------------------------------|
| NYSBA Sensors and CCTV Equipment                   | TO | NYSBA Maintenance and Construction  |
| NYSBA Sensors and CCTV Equipment                   | TO | NYSBA Maintenance and Construction  |
| NYSDOT DMS and HAR Information Broadcast Equipment | TO | NYSDOT Maintenance and Construction |
| NYSDOT DMS and HAR Information Broadcast Equipment | TO | NYSDOT Maintenance and Construction |
| NYSDOT RWIS Servers                                | TO | NYSDOT Maintenance and Construction |
| NYSDOT RWIS Servers                                | TO | NYSDOT Maintenance and Construction |
| NYSTA DMS and HAR Information Broadcast Equipment  | TO | NYSTA Maintenance and Construction  |
| NYSTA DMS and HAR Information Broadcast Equipment  | TO | NYSTA Maintenance and Construction  |
| NYSTA DSRC Equipment                               | TO | NYSTA Maintenance and Construction  |
| NYSTA DSRC Equipment                               | TO | NYSTA Maintenance and Construction  |
| NYSTA Sensors and CCTV Equipment                   | TO | NYSTA Maintenance and Construction  |
| NYSTA Sensors and CCTV Equipment                   | TO | NYSTA Maintenance and Construction  |

### **Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

## Architecture Flow

field equipment status

Traffic Management To Maintenance and Construction Management

### **Inventory**

|                                    |    |                                     |
|------------------------------------|----|-------------------------------------|
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| NYSBA Operations Center            | TO | NYSBA Maintenance and Construction  |
| NYSBA Operations Center            | TO | NYSBA Maintenance and Construction  |
| NYSBA Operations Center            | TO | NYSBA Maintenance and Construction  |
| NYSBA Satellite Operations Centers | TO | NYSBA Maintenance and Construction  |
| NYSBA Satellite Operations Centers | TO | NYSBA Maintenance and Construction  |
| NYSBA Satellite Operations Centers | TO | NYSBA Maintenance and Construction  |
| NYSTA Statewide Operations Center  | TO | NYSTA Maintenance and Construction  |
| NYSTA Statewide Operations Center  | TO | NYSTA Maintenance and Construction  |
| NYSTA Statewide Operations Center  | TO | NYSTA Maintenance and Construction  |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Maintenance and Construction  |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Maintenance and Construction  |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Maintenance and Construction  |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

## Architecture Flow

freeway control data

Traffic Management To Roadway Subsystem

### **Inventory**

|  |    |  |
|--|----|--|
| HVTMC Freeway Management System        | TO | NYSDOT DMS and HAR Information Broadcast Equipment |
| HVTMC Freeway Management System        | TO | NYSDOT DMS and HAR Information Broadcast Equipment |
| HVTMC Freeway Management System        | TO | NYSDOT DMS and HAR Information Broadcast Equipment |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment                  |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment                  |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment                  |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment                   |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment                   |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment                   |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment                   |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment                   |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment                   |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment                   |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment                   |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment                   |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment                   |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment                   |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment                   |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment                |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment                |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment                |

### Standards

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Ramp Meter Controller Objects (Data Dictionary, Message Set )

## Architecture Flow

freeway control status

Roadway Subsystem To Traffic Management

### **Inventory**

|                                     |    |  |
|-------------------------------------|----|--|
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |

### **Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Ramp Meter Controller Objects (Data Dictionary, Message Set )

## Architecture Flow

government reporting data receipt

Government Reporting Systems To Archived Data Management Subsystem

### **Inventory**

|                              |    |   |
|------------------------------|----|---|
| Government Reporting Systems | TO | HVTMC Incident Data Archive                     |
| Government Reporting Systems | TO | HVTMC Traffic Data Archive                      |
| Government Reporting Systems | TO | Metro North Data Management System              |
| Government Reporting Systems | TO | NYSBA Toll Archive System                       |
| Government Reporting Systems | TO | NYSTA Incident Data Archive                     |
| Government Reporting Systems | TO | NYSTA Traffic Data Storage and Retrieval System |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

## Architecture Flow

government reporting system data

Archived Data Management Subsystem To Government Reporting Systems

### **Inventory**

|   |    |                              |
|---|----|------------------------------|
| HVTMC Incident Data Archive                     | TO | Government Reporting Systems |
| HVTMC Traffic Data Archive                      | TO | Government Reporting Systems |
| Metro North Data Management System              | TO | Government Reporting Systems |
| NYSBA Toll Archive System                       | TO | Government Reporting Systems |
| NYSTA Incident Data Archive                     | TO | Government Reporting Systems |
| NYSTA Traffic Data Storage and Retrieval System | TO | Government Reporting Systems |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

## Architecture Flow

hazmat information

Fleet and Freight Management To Emergency Management

### **Inventory**

|                       |    |                                       |
|-----------------------|----|---------------------------------------|
| Motor Carrier Systems | TO | Local Emergency Dispatch              |
| Motor Carrier Systems | TO | Local Emergency Dispatch              |
| Motor Carrier Systems | TO | Local Emergency Dispatch              |
| Motor Carrier Systems | TO | NYSP Central Communication/Dispatch   |
| Motor Carrier Systems | TO | NYSP Central Communication/Dispatch   |
| Motor Carrier Systems | TO | NYSP Central Communication/Dispatch   |
| Motor Carrier Systems | TO | NYSTA Central Communications/Dispatch |
| Motor Carrier Systems | TO | NYSTA Central Communications/Dispatch |
| Motor Carrier Systems | TO | NYSTA Central Communications/Dispatch |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(IEEE) Standard for Hazardous Material IMMS for use by EMCs (Data Dictionary, Message Set )

**Architecture Flow**

hazmat information request

Emergency Management To Fleet and Freight Management

**Inventory**

|                                       |    |                       |
|---------------------------------------|----|-----------------------|
| Local Emergency Dispatch              | TO | Motor Carrier Systems |
| Local Emergency Dispatch              | TO | Motor Carrier Systems |
| Local Emergency Dispatch              | TO | Motor Carrier Systems |
| NYSP Central Communication/Dispatch   | TO | Motor Carrier Systems |
| NYSP Central Communication/Dispatch   | TO | Motor Carrier Systems |
| NYSP Central Communication/Dispatch   | TO | Motor Carrier Systems |
| NYSTA Central Communications/Dispatch | TO | Motor Carrier Systems |
| NYSTA Central Communications/Dispatch | TO | Motor Carrier Systems |
| NYSTA Central Communications/Dispatch | TO | Motor Carrier Systems |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(IEEE) Standard for Hazardous Material IMMS for use by EMCs (Data Dictionary, Message Set )

**Architecture Flow**

hri advisories

Traffic Management To Rail Operations

**Inventory**

|                                 |    |                             |
|---------------------------------|----|-----------------------------|
| HVTMC Freeway Management System | TO | Metro North Rail Operations |
|---------------------------------|----|-----------------------------|

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

hri control data

Traffic Management To Roadway Subsystem

**Inventory**

|  |    |                                     |
|--|----|-------------------------------------|
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |

**Standards**

None

**Architecture Flow**

hri operational status

Roadway Subsystem To Wayside Equipment

**Inventory**

|                                     |    |  |
|-------------------------------------|----|--|
| Local Sensors and CCTV Equipment    | TO | Railroad Grade Crossing Activation Equipment |
| NYSDOT Sensors and CCTV Equipment   | TO | Railroad Grade Crossing Activation Equipment |
| TRANSCOM Sensors and CCTV Equipment | TO | Railroad Grade Crossing Activation Equipment |

**Standards**

(IEEE) Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection (Data Dictionary, Message Set )

**Architecture Flow**

hri request

Traffic Management To Roadway Subsystem

**Inventory**

|  |    |                                     |
|--|----|-------------------------------------|
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |

**Standards**

None

**Architecture Flow**

hri status

Roadway Subsystem To Traffic Management

**Inventory**

|                                     |    |  |
|-------------------------------------|----|--|
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |

**Standards**

None

**Architecture Flow**

incident command information

Emergency Management To Emergency Vehicle Subsystem

**Inventory**

|                                     |    |  |
|-------------------------------------|----|--|
| Local Emergency Dispatch            | TO | Local Emergency Vehicles (Fire, EMS, Police) |
| NYSP Central Communication/Dispatch | TO | NYSDOT HELP Trucks                           |
| NYSP Central Communication/Dispatch | TO | NYSP Vehicles                                |

**Standards**

None



**Architecture Flow**

incident command information presentation

Emergency Vehicle Subsystem To Emergency Personnel

**Inventory**

|  |    |                              |
|--|----|------------------------------|
| Local Emergency Vehicles (Fire, EMS, Police) | TO | Local Emergency Personnel    |
| MTA Mobile Communications Device             | TO | MTA Police Department        |
| NYSP Vehicles                                | TO | NYSP State Police All Troops |
| NYSTA Troop T Vehicles                       | TO | NYSTA State Police Troop T   |

**Standards**

None

**Architecture Flow**

incident command request

Emergency Vehicle Subsystem To Emergency Management

**Inventory**

|  |    |                                     |
|--|----|-------------------------------------|
| Local Emergency Vehicles (Fire, EMS, Police) | TO | Local Emergency Dispatch            |
| NYSDOT HELP Trucks                           | TO | NYSP Central Communication/Dispatch |
| NYSP Vehicles                                | TO | NYSP Central Communication/Dispatch |

**Standards**

None

**Architecture Flow**

incident information

Emergency Management To Information Service Provider

**Inventory**

|                                    |    |                                     |
|------------------------------------|----|-------------------------------------|
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System    | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System    | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System    | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System    | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System    | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System    | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System    | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System    | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System    | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System    | TO | NYSP Central Communication/Dispatch |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System     |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System     |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System     |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System     |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System     |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System     |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System     |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System     |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System     |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System     |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System     |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System     |
| Local Maintenance and Construction | TO | HVTMC Freeway Management System     |
| NYSBA Maintenance and Construction | TO | NYSBA Operations Center             |
| NYSBA Maintenance and Construction | TO | NYSBA Operations Center             |





















## Architecture Flow

incident information for media

Emergency Management To Media

### **Inventory**

|                                       |    |   |
|---------------------------------------|----|---|
| Local Emergency Dispatch              | TO | Media Traffic and Travel Information System |
| Local Emergency Dispatch              | TO | Media Traffic and Travel Information System |
| Local Emergency Dispatch              | TO | Media Traffic and Travel Information System |
| MTA Police                            | TO | Media Traffic and Travel Information System |
| MTA Police                            | TO | Media Traffic and Travel Information System |
| MTA Police                            | TO | Media Traffic and Travel Information System |
| NYSP Central Communication/Dispatch   | TO | Media Traffic and Travel Information System |
| NYSP Central Communication/Dispatch   | TO | Media Traffic and Travel Information System |
| NYSP Central Communication/Dispatch   | TO | Media Traffic and Travel Information System |
| NYSTA Central Communications/Dispatch | TO | Media Traffic and Travel Information System |
| NYSTA Central Communications/Dispatch | TO | Media Traffic and Travel Information System |
| NYSTA Central Communications/Dispatch | TO | Media Traffic and Travel Information System |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Common Incident Management Message Sets (IMMS) for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

## Architecture Flow

incident information request

Information Service Provider To Emergency Management

### **Inventory**

|                                 |    |                                     |
|---------------------------------|----|-------------------------------------|
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Common Incident Management Message Sets (IMMS) for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(IEEE) Standard for Traffic Incident Management Message Sets for Use by EMCs (Data Dictionary, Message Set )

**Architecture Flow**

incident notification

Emergency Telecommunications System To Emergency Management

**Inventory**

|                         |    |                                       |
|-------------------------|----|---------------------------------------|
| Emergency Call 911 PSAP | TO | Local Emergency Dispatch              |
| Emergency Call 911 PSAP | TO | NYSP Central Communication/Dispatch   |
| Emergency Call 911 PSAP | TO | NYSTA Central Communications/Dispatch |

**Standards**

None

**Architecture Flow**

incident notification response

Emergency Management To Emergency Telecommunications System

**Inventory**

|                                       |    |                         |
|---------------------------------------|----|-------------------------|
| Local Emergency Dispatch              | TO | Emergency Call 911 PSAP |
| NYSP Central Communication/Dispatch   | TO | Emergency Call 911 PSAP |
| NYSTA Central Communications/Dispatch | TO | Emergency Call 911 PSAP |

**Standards**

None

## Architecture Flow

incident report

Emergency Management To Other EM

### **Inventory**

|                                       |    |                                       |
|---------------------------------------|----|---------------------------------------|
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |

|                                       |    |                                       |
|---------------------------------------|----|---------------------------------------|
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Common Incident Management Message Sets (IMMS) for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(IEEE) Standard for Hazardous Material IMMS for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Public Safety IMMS for use by EMCs (Data Dictionary, Message Set )

## Architecture Flow

incident response coordination

Emergency Management To Other EM

### **Inventory**

|                                       |    |                                       |
|---------------------------------------|----|---------------------------------------|
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | MTA Police                            |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |



|                                       |    |                                       |
|---------------------------------------|----|---------------------------------------|
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| Local Emergency Dispatch              | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | Local Emergency Dispatch              |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| MTA Police                            | TO | NYSP Central Communication/Dispatch   |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | Local Emergency Dispatch              |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | MTA Police                            |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSP Central Communication/Dispatch   | TO | NYSTA Central Communications/Dispatch |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |
| NYSTA Central Communications/Dispatch | TO | NYSP Central Communication/Dispatch   |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Common Incident Management Message Sets (IMMS) for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(IEEE) Standard for Hazardous Material IMMS for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Public Safety IMMS for use by EMCs (Data Dictionary, Message Set )

**Architecture Flow**

incident response status

Emergency Management To Maintenance and Construction Management

**Inventory**

|                                     |    |                                 |
|-------------------------------------|----|---------------------------------|
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Common Incident Management Message Sets (IMMS) for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(IEEE) Standard for Hazardous Material IMMS for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Public Safety IMMS for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Traffic Incident Management Message Sets for Use by EMCs (Data Dictionary, Message Set )

**Architecture Flow**

incident status

Emergency Vehicle Subsystem To Emergency Management

**Inventory**

|  |    |                                     |
|--|----|-------------------------------------|
| Local Emergency Vehicles (Fire, EMS, Police) | TO | Local Emergency Dispatch            |
| NYSDOT HELP Trucks                           | TO | NYSP Central Communication/Dispatch |
| NYSP Vehicles                                | TO | NYSP Central Communication/Dispatch |

**Standards**

None

**Architecture Flow**

infrastructure conditions data

Maintenance and Construction Vehicle To Maintenance and Construction Management

**Inventory**

|                                       |    |                                     |
|---------------------------------------|----|-------------------------------------|
| Bridge Authority Maintenance Vehicles | TO | NYSBA Maintenance and Construction  |
| Local Road Maintenance Vehicles       | TO | Local Maintenance and Construction  |
| NYSDOT Road Maintenance Vehicles      | TO | NYSDOT Maintenance and Construction |
| NYSTA Road Maintenance Vehicles       | TO | NYSTA Maintenance and Construction  |

**Standards**

None

**Architecture Flow**

infrastructure monitoring sensor control

Maintenance and Construction Management To Roadway Subsystem

**Inventory**

|                                    |    |                                  |
|------------------------------------|----|----------------------------------|
| NYSBA Maintenance and Construction | TO | NYSBA Sensors and CCTV Equipment |
| NYSTA Maintenance and Construction | TO | NYSTA DSRC Equipment             |
| NYSTA Maintenance and Construction | TO | NYSTA Sensors and CCTV Equipment |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

**Architecture Flow**

infrastructure monitoring sensor data

Roadway Subsystem To Maintenance and Construction Management

**Inventory**

|                                  |    |                                    |
|----------------------------------|----|------------------------------------|
| NYSBA Sensors and CCTV Equipment | TO | NYSBA Maintenance and Construction |
| NYSTA DSRC Equipment             | TO | NYSTA Maintenance and Construction |
| NYSTA Sensors and CCTV Equipment | TO | NYSTA Maintenance and Construction |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

**Architecture Flow**

intersection blockage notification

Roadway Subsystem To Traffic Management

**Inventory**

|                                     |    |  |
|-------------------------------------|----|--|
| Local Sensors and CCTV Equipment    | TO | Railroad Grade Crossing Activation Equipment |
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System             |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System           |
| Local Sensors and CCTV Equipment    | TO | Railroad Grade Crossing Activation Equipment |
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System             |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System           |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                      |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers           |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                      |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers           |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System              |
| NYSDOT Sensors and CCTV Equipment   | TO | Railroad Grade Crossing Activation Equipment |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System              |
| NYSDOT Sensors and CCTV Equipment   | TO | Railroad Grade Crossing Activation Equipment |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center            |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub                |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center            |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub                |
| TRANSCOM Sensors and CCTV Equipment | TO | Railroad Grade Crossing Activation Equipment |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center       |
| TRANSCOM Sensors and CCTV Equipment | TO | Railroad Grade Crossing Activation Equipment |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center       |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(IEEE) Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection (Data Dictionary, Message Set )

**Architecture Flow**

intersection status

Roadway Subsystem To Vehicle

**Inventory**

|                      |    |                                |
|----------------------|----|--------------------------------|
| NYSTA DSRC Equipment | TO | NYSTA DSRC Receiving Equipment |
|----------------------|----|--------------------------------|

**Standards**

None

## **Architecture Flow**

in-vehicle transaction status

Vehicle To Driver

## **Inventory**

|                          |    |                            |
|--------------------------|----|----------------------------|
| NYSBA Toll Tag Interface | TO | Driver Operating A Vehicle |
| NYSBA Toll Tag Interface | TO | Driver Operating A Vehicle |
| NYSTA Toll Tag Interface | TO | Driver Operating A Vehicle |
| NYSTA Toll Tag Interface | TO | Driver Operating A Vehicle |

## **Standards**

(SAE) ITS In-Vehicle Message Priority (Human Factors)

(SAE) Measurement of Driver Visual Behavior Using Video Based Methods (Def. & Meas.) (Human Factors)



|  |    |  |
|--|----|--|
| SATIN (Service Area Travelers Interactive Network) | TO | Other Privatized ISPs                              |
| HVTMC ITS Information Service Provider             | TO | Other Privatized ISPs                              |
| HVTMC ITS Information Service Provider             | TO | Other Privatized ISPs                              |
| HVTMC ITS Information Service Provider             | TO | Other Privatized ISPs                              |
| HVTMC ITS Information Service Provider             | TO | Other Privatized ISPs                              |
| HVTMC ITS Information Service Provider             | TO | Other Privatized ISPs                              |
| NYSBA ITS Information Service Provider             | TO | Other Privatized ISPs                              |
| NYSBA ITS Information Service Provider             | TO | Other Privatized ISPs                              |
| NYSBA ITS Information Service Provider             | TO | Other Privatized ISPs                              |
| NYSBA ITS Information Service Provider             | TO | Other Privatized ISPs                              |
| NYSBA ITS Information Service Provider             | TO | Other Privatized ISPs                              |
| NYSTA ITS Information Service Provider             | TO | Other Privatized ISPs                              |
| NYSTA ITS Information Service Provider             | TO | Other Privatized ISPs                              |
| NYSTA ITS Information Service Provider             | TO | Other Privatized ISPs                              |
| NYSTA ITS Information Service Provider             | TO | Other Privatized ISPs                              |
| NYSTA ITS Information Service Provider             | TO | Other Privatized ISPs                              |
| Other Privatized ISPs                              | TO | HVTMC ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | HVTMC ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | HVTMC ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | HVTMC ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | HVTMC ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | NYSBA ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | NYSBA ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | NYSBA ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | NYSBA ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | NYSBA ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | NYSBA ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | NYSTA ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | NYSTA ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | NYSTA ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | NYSTA ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | NYSTA ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | NYSTA ITS Information Service Provider             |
| Other Privatized ISPs                              | TO | SATIN (Service Area Travelers Interactive Network) |
| Other Privatized ISPs                              | TO | SATIN (Service Area Travelers Interactive Network) |
| Other Privatized ISPs                              | TO | SATIN (Service Area Travelers Interactive Network) |
| Other Privatized ISPs                              | TO | SATIN (Service Area Travelers Interactive Network) |
| Other Privatized ISPs                              | TO | SATIN (Service Area Travelers Interactive Network) |
| SATIN (Service Area Travelers Interactive Network) | TO | Other Privatized ISPs                              |
| SATIN (Service Area Travelers Interactive Network) | TO | Other Privatized ISPs                              |
| SATIN (Service Area Travelers Interactive Network) | TO | Other Privatized ISPs                              |
| SATIN (Service Area Travelers Interactive Network) | TO | Other Privatized ISPs                              |
| SATIN (Service Area Travelers Interactive Network) | TO | Other Privatized ISPs                              |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

**Architecture Flow**

ISP operating parameter updates

ISP Operator To Information Service Provider

**Inventory**

|   |    |  |
|---|----|--|
| Travel and Traffic Information Operator | TO | HVTMC ITS Information Service Provider |
| Travel and Traffic Information Operator | TO | NYSBA ITS Information Service Provider |
| Travel and Traffic Information Operator | TO | NYSTA ITS Information Service Provider |
| Travel and Traffic Information Operator | TO | Other Privatized ISPs                  |

**Standards**

None

**Architecture Flow**

ISP operating parameters

Information Service Provider To ISP Operator

**Inventory**

|  |    |   |
|--|----|---|
| HVTMC ITS Information Service Provider | TO | Travel and Traffic Information Operator |
| NYSBA ITS Information Service Provider | TO | Travel and Traffic Information Operator |
| NYSTA ITS Information Service Provider | TO | Travel and Traffic Information Operator |
| Other Privatized ISPs                  | TO | Travel and Traffic Information Operator |

**Standards**

None



**Architecture Flow**

license request

Toll Administration To DMV

**Inventory**

NYSBA Toll Operations

TO Vehicle Title and Registration Division

NYSTA Toll Operations

TO Vehicle Title and Registration Division

**Standards**

None

## Architecture Flow

logged special vehicle route

Information Service Provider To Traffic Management

### **Inventory**

|  |    |  |
|--|----|--|
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |

|  |    |  |
|--|----|--|
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

**Architecture Flow**

maint and constr administrative information

Maintenance and Construction Administrative Systems To Maintenance and Constructio

**Inventory**

NYSDOT MAMIS System TO NYSDOT Maintenance and Construction

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

maint and constr administrative request

Maintenance and Construction Management To Maintenance and Construction Administ

**Inventory**

NYSDOT Maintenance and Construction TO NYSDOT MAMIS System

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

## Architecture Flow

maint and constr archive data

Maintenance and Construction Management To Archived Data Management Subsystem

### **Inventory**

|                                     |    |  |
|-------------------------------------|----|--|
| NYSBA Maintenance and Construction  | TO | NYSBA Toll Archive System                            |
| NYSBA Maintenance and Construction  | TO | NYSBA Toll Archive System                            |
| NYSBA Maintenance and Construction  | TO | NYSBA Toll Archive System                            |
| NYSDOT Maintenance and Construction | TO | HVTMC Traffic Data Archive                           |
| NYSDOT Maintenance and Construction | TO | HVTMC Traffic Data Archive                           |
| NYSDOT Maintenance and Construction | TO | HVTMC Traffic Data Archive                           |
| NYSDOT Maintenance and Construction | TO | NYSDOT Maintenance Management System                 |
| NYSDOT Maintenance and Construction | TO | NYSDOT Maintenance Management System                 |
| NYSDOT Maintenance and Construction | TO | NYSDOT Maintenance Management System                 |
| NYSTA Maintenance and Construction  | TO | NYSTA Infrastructure Inventory and Inspection System |
| NYSTA Maintenance and Construction  | TO | NYSTA Infrastructure Inventory and Inspection System |
| NYSTA Maintenance and Construction  | TO | NYSTA Infrastructure Inventory and Inspection System |
| NYSTA Maintenance and Construction  | TO | NYSTA Maintenance Management System                  |
| NYSTA Maintenance and Construction  | TO | NYSTA Maintenance Management System                  |
| NYSTA Maintenance and Construction  | TO | NYSTA Maintenance Management System                  |
| NYSTA Maintenance and Construction  | TO | NYSTA Toll Data Storage System                       |
| NYSTA Maintenance and Construction  | TO | NYSTA Toll Data Storage System                       |
| NYSTA Maintenance and Construction  | TO | NYSTA Toll Data Storage System                       |
| NYSTA Maintenance and Construction  | TO | NYSTA Traffic Data Storage and Retrieval System      |
| NYSTA Maintenance and Construction  | TO | NYSTA Traffic Data Storage and Retrieval System      |
| NYSTA Maintenance and Construction  | TO | NYSTA Traffic Data Storage and Retrieval System      |

### Standards

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

**Architecture Flow**

maint and constr center personnel inputs

Maintenance and Construction Center Personnel To Maintenance and Construction Man

**Inventory**

|                              |    |                                     |
|------------------------------|----|-------------------------------------|
| Local Maintenance Personnel  | TO | Local Maintenance and Construction  |
| NYSBA Maintenance Personnel  | TO | NYSBA Maintenance and Construction  |
| NYSDOT Maintenance Personnel | TO | NYSDOT Maintenance and Construction |
| NYSTA Maintenance Personnel  | TO | NYSTA Maintenance and Construction  |

**Standards**

None

**Architecture Flow**

maint and constr dispatch information

Maintenance and Construction Management To Maintenance and Construction Vehicle

**Inventory**

|                                     |    |                                       |
|-------------------------------------|----|---------------------------------------|
| Local Maintenance and Construction  | TO | Local Road Maintenance Vehicles       |
| NYSBA Maintenance and Construction  | TO | Bridge Authority Maintenance Vehicles |
| NYSDOT Maintenance and Construction | TO | NYSDOT Road Maintenance Vehicles      |
| NYSTA Maintenance and Construction  | TO | NYSTA Road Maintenance Vehicles       |

**Standards**

None

**Architecture Flow**

maint and constr dispatch status

Maintenance and Construction Vehicle To Maintenance and Construction Management

**Inventory**

|                                       |    |                                     |
|---------------------------------------|----|-------------------------------------|
| Bridge Authority Maintenance Vehicles | TO | NYSBA Maintenance and Construction  |
| Local Road Maintenance Vehicles       | TO | Local Maintenance and Construction  |
| NYSDOT Road Maintenance Vehicles      | TO | NYSDOT Maintenance and Construction |
| NYSTA Road Maintenance Vehicles       | TO | NYSTA Maintenance and Construction  |

**Standards**

None

**Architecture Flow**

maint and constr equipment repair status

Equipment Repair Facility To Maintenance and Construction Management

**Inventory**

|                             |    |                                     |
|-----------------------------|----|-------------------------------------|
| Local Maintenance Facility  | TO | Local Maintenance and Construction  |
| NYSBA Maintenance Facility  | TO | NYSBA Maintenance and Construction  |
| NYSDOT Maintenance Facility | TO | NYSDOT Maintenance and Construction |
| NYSTA Maintenance Facility  | TO | NYSTA Maintenance and Construction  |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

maint and constr field personnel information presen

Maintenance and Construction Vehicle To Maintenance and Construction Field Personne

**Inventory**

|                                       |    |                                    |
|---------------------------------------|----|------------------------------------|
| Bridge Authority Maintenance Vehicles | TO | NYSBA Maintenance Field Personnel  |
| Local Road Maintenance Vehicles       | TO | Local Maintenance Field Personnel  |
| NYSDOT Road Maintenance Vehicles      | TO | NYSDOT Maintenance Field Personnel |
| NYSTA Road Maintenance Vehicles       | TO | NYSTA Maintenance Field Personnel  |

**Standards**

None

**Architecture Flow**

maint and constr field personnel inputs

Maintenance and Construction Field Personnel To Maintenance and Construction Vehicl

**Inventory**

|                                    |    |                                       |
|------------------------------------|----|---------------------------------------|
| Local Maintenance Field Personnel  | TO | Local Road Maintenance Vehicles       |
| NYSBA Maintenance Field Personnel  | TO | Bridge Authority Maintenance Vehicles |
| NYSDOT Maintenance Field Personnel | TO | NYSDOT Road Maintenance Vehicles      |
| NYSTA Maintenance Field Personnel  | TO | NYSTA Road Maintenance Vehicles       |

**Standards**

None

**Architecture Flow**

maint and constr fleet information

Maintenance and Construction Management To Equipment Repair Facility

**Inventory**

|                                     |    |                             |
|-------------------------------------|----|-----------------------------|
| Local Maintenance and Construction  | TO | Local Maintenance Facility  |
| NYSBA Maintenance and Construction  | TO | NYSBA Maintenance Facility  |
| NYSDOT Maintenance and Construction | TO | NYSDOT Maintenance Facility |
| NYSTA Maintenance and Construction  | TO | NYSTA Maintenance Facility  |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

maint and constr material information

Basic Maintenance and Construction Vehicle To Maintenance and Construction Vehicle

**Inventory**

|                              |    |                                       |
|------------------------------|----|---------------------------------------|
| Non ITS Equipment Monitoring | TO | Bridge Authority Maintenance Vehicles |
| Non ITS Equipment Monitoring | TO | Local Road Maintenance Vehicles       |
| Non ITS Equipment Monitoring | TO | NYSDOT Road Maintenance Vehicles      |
| Non ITS Equipment Monitoring | TO | NYSTA Road Maintenance Vehicles       |

**Standards**

None

**Architecture Flow**

maint and constr operations information presentatio

Maintenance and Construction Management To Maintenance and Construction Center Pe

**Inventory**

|                                     |    |                              |
|-------------------------------------|----|------------------------------|
| Local Maintenance and Construction  | TO | Local Maintenance Personnel  |
| NYSBA Maintenance and Construction  | TO | NYSBA Maintenance Personnel  |
| NYSDOT Maintenance and Construction | TO | NYSDOT Maintenance Personnel |
| NYSTA Maintenance and Construction  | TO | NYSTA Maintenance Personnel  |

**Standards**

None



## Architecture Flow

maint and constr resource request

### Emergency Management To Maintenance and Construction Management

#### **Inventory**

|                                    |    |                                     |
|------------------------------------|----|-------------------------------------|
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| NYSBA Operations Center            | TO | NYSBA Maintenance and Construction  |
| NYSBA Operations Center            | TO | NYSBA Maintenance and Construction  |
| NYSBA Operations Center            | TO | NYSBA Maintenance and Construction  |
| NYSBA Operations Center            | TO | NYSBA Maintenance and Construction  |
| NYSBA Satellite Operations Centers | TO | NYSBA Maintenance and Construction  |
| NYSBA Satellite Operations Centers | TO | NYSBA Maintenance and Construction  |
| NYSBA Satellite Operations Centers | TO | NYSBA Maintenance and Construction  |
| NYSBA Satellite Operations Centers | TO | NYSBA Maintenance and Construction  |
| NYSTA Statewide Operations Center  | TO | NYSTA Maintenance and Construction  |
| NYSTA Statewide Operations Center  | TO | NYSTA Maintenance and Construction  |
| NYSTA Statewide Operations Center  | TO | NYSTA Maintenance and Construction  |
| NYSTA Statewide Operations Center  | TO | NYSTA Maintenance and Construction  |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Maintenance and Construction  |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Maintenance and Construction  |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Maintenance and Construction  |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| NYSBA Operations Center            | TO | NYSBA Maintenance and Construction  |
| NYSBA Operations Center            | TO | NYSBA Maintenance and Construction  |
| NYSBA Operations Center            | TO | NYSBA Maintenance and Construction  |
| NYSBA Satellite Operations Centers | TO | NYSBA Maintenance and Construction  |
| NYSBA Satellite Operations Centers | TO | NYSBA Maintenance and Construction  |
| NYSBA Satellite Operations Centers | TO | NYSBA Maintenance and Construction  |
| NYSTA Statewide Operations Center  | TO | NYSTA Maintenance and Construction  |
| NYSTA Statewide Operations Center  | TO | NYSTA Maintenance and Construction  |
| NYSTA Statewide Operations Center  | TO | NYSTA Maintenance and Construction  |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Maintenance and Construction  |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Maintenance and Construction  |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Maintenance and Construction  |

## Standards

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Common Incident Management Message Sets (IMMS) for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(IEEE) Standard for Traffic Incident Management Message Sets for Use by EMCs (Data Dictionary, Message Set )

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

**Architecture Flow**

maint and constr resource response

Maintenance and Construction Management To Emergency Management

**Inventory**

|                                     |    |                                    |
|-------------------------------------|----|------------------------------------|
| Local Maintenance and Construction  | TO | HVTMC Freeway Management System    |
| Local Maintenance and Construction  | TO | HVTMC Freeway Management System    |
| Local Maintenance and Construction  | TO | HVTMC Freeway Management System    |
| Local Maintenance and Construction  | TO | HVTMC Freeway Management System    |
| Local Maintenance and Construction  | TO | HVTMC Freeway Management System    |
| Local Maintenance and Construction  | TO | HVTMC Freeway Management System    |
| Local Maintenance and Construction  | TO | HVTMC Freeway Management System    |
| NYSBA Maintenance and Construction  | TO | NYSBA Operations Center            |
| NYSBA Maintenance and Construction  | TO | NYSBA Operations Center            |
| NYSBA Maintenance and Construction  | TO | NYSBA Operations Center            |
| NYSBA Maintenance and Construction  | TO | NYSBA Operations Center            |
| NYSBA Maintenance and Construction  | TO | NYSBA Satellite Operations Centers |
| NYSBA Maintenance and Construction  | TO | NYSBA Satellite Operations Centers |
| NYSBA Maintenance and Construction  | TO | NYSBA Satellite Operations Centers |
| NYSBA Maintenance and Construction  | TO | NYSBA Satellite Operations Centers |
| NYSBA Maintenance and Construction  | TO | NYSBA Operations Center            |
| NYSBA Maintenance and Construction  | TO | NYSBA Operations Center            |
| NYSBA Maintenance and Construction  | TO | NYSBA Operations Center            |
| NYSBA Maintenance and Construction  | TO | NYSBA Satellite Operations Centers |
| NYSBA Maintenance and Construction  | TO | NYSBA Satellite Operations Centers |
| NYSBA Maintenance and Construction  | TO | NYSBA Satellite Operations Centers |
| NYSDOT Maintenance and Construction | TO | HVTMC Freeway Management System    |
| NYSDOT Maintenance and Construction | TO | HVTMC Freeway Management System    |
| NYSDOT Maintenance and Construction | TO | HVTMC Freeway Management System    |
| NYSDOT Maintenance and Construction | TO | HVTMC Freeway Management System    |
| NYSDOT Maintenance and Construction | TO | HVTMC Freeway Management System    |
| NYSDOT Maintenance and Construction | TO | HVTMC Freeway Management System    |
| NYSDOT Maintenance and Construction | TO | HVTMC Freeway Management System    |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center  |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center  |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center  |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center  |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub      |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub      |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub      |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub      |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center  |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center  |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center  |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub      |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub      |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub      |

## Standards

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Common Incident Management Message Sets (IMMS) for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(IEEE) Standard for Traffic Incident Management Message Sets for Use by EMCs (Data Dictionary, Message Set )

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

## Architecture Flow

maint and constr vehicle condition presentation

Maintenance and Construction Vehicle To Maintenance and Construction Field Personne

### **Inventory**

|                                       |    |                                    |
|---------------------------------------|----|------------------------------------|
| Bridge Authority Maintenance Vehicles | TO | NYSBA Maintenance Field Personnel  |
| Local Road Maintenance Vehicles       | TO | Local Maintenance Field Personnel  |
| NYSDOT Road Maintenance Vehicles      | TO | NYSDOT Maintenance Field Personnel |
| NYSTA Road Maintenance Vehicles       | TO | NYSTA Maintenance Field Personnel  |

### Standards

None

## Architecture Flow

maint and constr vehicle conditions

Maintenance and Construction Vehicle To Maintenance and Construction Management

### **Inventory**

|                                       |    |                                     |
|---------------------------------------|----|-------------------------------------|
| Bridge Authority Maintenance Vehicles | TO | NYSBA Maintenance and Construction  |
| Bridge Authority Maintenance Vehicles | TO | NYSBA Maintenance Facility          |
| Local Road Maintenance Vehicles       | TO | Local Maintenance and Construction  |
| Local Road Maintenance Vehicles       | TO | Local Maintenance Facility          |
| NYSDOT Road Maintenance Vehicles      | TO | NYSDOT Maintenance and Construction |
| NYSDOT Road Maintenance Vehicles      | TO | NYSDOT Maintenance Facility         |
| NYSTA Road Maintenance Vehicles       | TO | NYSTA Maintenance and Construction  |
| NYSTA Road Maintenance Vehicles       | TO | NYSTA Maintenance Facility          |

### Standards

None

**Architecture Flow**

maint and constr vehicle control

Maintenance and Construction Vehicle To Basic Maintenance and Construction Vehicle

**Inventory**

|                                       |    |                              |
|---------------------------------------|----|------------------------------|
| Bridge Authority Maintenance Vehicles | TO | Non ITS Equipment Monitoring |
| Local Road Maintenance Vehicles       | TO | Non ITS Equipment Monitoring |
| NYSDOT Road Maintenance Vehicles      | TO | Non ITS Equipment Monitoring |
| NYSTA Road Maintenance Vehicles       | TO | Non ITS Equipment Monitoring |

**Standards**

None

**Architecture Flow**

maint and constr vehicle location data

Maintenance and Construction Vehicle To Maintenance and Construction Management

**Inventory**

|                                       |    |                                     |
|---------------------------------------|----|-------------------------------------|
| Bridge Authority Maintenance Vehicles | TO | NYSBA Maintenance and Construction  |
| Local Road Maintenance Vehicles       | TO | Local Maintenance and Construction  |
| NYSDOT Road Maintenance Vehicles      | TO | NYSDOT Maintenance and Construction |
| NYSTA Road Maintenance Vehicles       | TO | NYSTA Maintenance and Construction  |

**Standards**

None

**Architecture Flow**

maint and constr vehicle measures

Basic Maintenance and Construction Vehicle To Maintenance and Construction Vehicle

**Inventory**

|                              |    |                                       |
|------------------------------|----|---------------------------------------|
| Non ITS Equipment Monitoring | TO | Bridge Authority Maintenance Vehicles |
| Non ITS Equipment Monitoring | TO | Local Road Maintenance Vehicles       |
| Non ITS Equipment Monitoring | TO | NYSDOT Road Maintenance Vehicles      |
| Non ITS Equipment Monitoring | TO | NYSTA Road Maintenance Vehicles       |

**Standards**

None

**Architecture Flow**

maint and constr vehicle operational data

Maintenance and Construction Vehicle To Maintenance and Construction Management

**Inventory**

|                                       |    |                                     |
|---------------------------------------|----|-------------------------------------|
| Bridge Authority Maintenance Vehicles | TO | NYSBA Maintenance and Construction  |
| Local Road Maintenance Vehicles       | TO | Local Maintenance and Construction  |
| NYSDOT Road Maintenance Vehicles      | TO | NYSDOT Maintenance and Construction |
| NYSTA Road Maintenance Vehicles       | TO | NYSTA Maintenance and Construction  |

**Standards**

None

**Architecture Flow**

maint and constr vehicle system control

Maintenance and Construction Management To Maintenance and Construction Vehicle

**Inventory**

|                                     |    |                                       |
|-------------------------------------|----|---------------------------------------|
| Local Maintenance and Construction  | TO | Local Road Maintenance Vehicles       |
| NYSBA Maintenance and Construction  | TO | Bridge Authority Maintenance Vehicles |
| NYSDOT Maintenance and Construction | TO | NYSDOT Road Maintenance Vehicles      |
| NYSTA Maintenance and Construction  | TO | NYSTA Road Maintenance Vehicles       |

**Standards**

None

**Architecture Flow**

maint and constr work performance

Maintenance and Construction Management To Maintenance and Construction Administ

**Inventory**

|                                     |    |                     |
|-------------------------------------|----|---------------------|
| NYSDOT Maintenance and Construction | TO | NYSDOT MAMIS System |
|-------------------------------------|----|---------------------|

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)







**Architecture Flow**

maintenance and repair needs

Asset Management To Maintenance and Construction Management

**Inventory**

|  |    |                                     |
|--|----|-------------------------------------|
| Local Asset Management System for Maintenance  | TO | Local Maintenance and Construction  |
| NYSBA Asset Management System for Maintenance  | TO | NYSBA Maintenance and Construction  |
| NYSDOT Asset Management System for Maintenance | TO | NYSDOT Maintenance and Construction |
| NYSTA Asset Management System for Maintenance  | TO | NYSTA Maintenance and Construction  |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

maintenance materials storage status

Storage Facility To Maintenance and Construction Management

**Inventory**

|                                |    |                                     |
|--------------------------------|----|-------------------------------------|
| Local Maint. Storage Facility  | TO | Local Maintenance and Construction  |
| NYSBA Maint. Storage Facility  | TO | NYSBA Maintenance and Construction  |
| NYSDOT Maint. Storage Facility | TO | NYSDOT Maintenance and Construction |
| NYSTA Maint. Storage Facility  | TO | NYSTA Maintenance and Construction  |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

maintenance status

Transit Maintenance Personnel To Transit Management

**Inventory**

|  |    |   |
|--|----|---|
| Bee-Line Vehicle Maintenance Crew          | TO | Bee-Line Bus Operations Dispatch System   |
| Dutchess LOOP Bus Vehicle Maintenance Crew | TO | Dutchess LOOP Bus Dispatch System         |
| Metro North Equipment Maintenance Crew     | TO | Metro North Rail Operation Control Center |
| PART Bus Vehicle Maintenance Crew          | TO | PART Bus System                           |
| Rockland TOR Bus Vehicle Maintenance Crew  | TO | Rockland TOR                              |

**Standards**

None

## Architecture Flow

map update request

Archived Data Management Subsystem To Map Update Provider

### **Inventory**

|   |    |                             |
|---|----|-----------------------------|
| Bee-Line Bus Operations Dispatch System   | TO | Transit Map Update Provider |
| Bee-Line Data Management System           | TO | Transit Map Update Provider |
| Dutchess LOOP Bus Dispatch System         | TO | Transit Map Update Provider |
| HVTMC Freeway Management System           | TO | NYSDOT Map Update Provider  |
| HVTMC ITS Information Service Provider    | TO | NYSDOT Map Update Provider  |
| Metro North Rail Operation Control Center | TO | Transit Map Update Provider |
| NYSDOT Maintenance and Construction       | TO | NYSDOT Map Update Provider  |
| NYSP Central Communication/Dispatch       | TO | NYSP Map Update Provider    |
| NYSTA ITS Information Service Provider    | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance and Construction        | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance Management System       | TO | NYSTA Map Update Provider   |
| NYSTA Statewide Operations Center         | TO | NYSTA Map Update Provider   |
| PART Bus System                           | TO | Transit Map Update Provider |
| Rockland TOR                              | TO | Transit Map Update Provider |
| Bee-Line Bus Operations Dispatch System   | TO | Transit Map Update Provider |
| Bee-Line Data Management System           | TO | Transit Map Update Provider |
| Dutchess LOOP Bus Dispatch System         | TO | Transit Map Update Provider |
| HVTMC Freeway Management System           | TO | NYSDOT Map Update Provider  |
| HVTMC ITS Information Service Provider    | TO | NYSDOT Map Update Provider  |
| Metro North Rail Operation Control Center | TO | Transit Map Update Provider |
| NYSDOT Maintenance and Construction       | TO | NYSDOT Map Update Provider  |
| NYSP Central Communication/Dispatch       | TO | NYSP Map Update Provider    |
| NYSTA ITS Information Service Provider    | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance and Construction        | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance Management System       | TO | NYSTA Map Update Provider   |
| NYSTA Statewide Operations Center         | TO | NYSTA Map Update Provider   |
| PART Bus System                           | TO | Transit Map Update Provider |
| Rockland TOR                              | TO | Transit Map Update Provider |
| Bee-Line Bus Operations Dispatch System   | TO | Transit Map Update Provider |
| Bee-Line Data Management System           | TO | Transit Map Update Provider |
| Dutchess LOOP Bus Dispatch System         | TO | Transit Map Update Provider |
| HVTMC Freeway Management System           | TO | NYSDOT Map Update Provider  |
| HVTMC ITS Information Service Provider    | TO | NYSDOT Map Update Provider  |
| Metro North Rail Operation Control Center | TO | Transit Map Update Provider |
| NYSDOT Maintenance and Construction       | TO | NYSDOT Map Update Provider  |
| NYSP Central Communication/Dispatch       | TO | NYSP Map Update Provider    |
| NYSTA ITS Information Service Provider    | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance and Construction        | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance Management System       | TO | NYSTA Map Update Provider   |
| NYSTA Statewide Operations Center         | TO | NYSTA Map Update Provider   |
| PART Bus System                           | TO | Transit Map Update Provider |
| Rockland TOR                              | TO | Transit Map Update Provider |
| Bee-Line Bus Operations Dispatch System   | TO | Transit Map Update Provider |
| Bee-Line Data Management System           | TO | Transit Map Update Provider |
| Dutchess LOOP Bus Dispatch System         | TO | Transit Map Update Provider |
| HVTMC Freeway Management System           | TO | NYSDOT Map Update Provider  |

|   |    |                             |
|---|----|-----------------------------|
| HVTMC ITS Information Service Provider    | TO | NYSDOT Map Update Provider  |
| Metro North Rail Operation Control Center | TO | Transit Map Update Provider |
| NYSDOT Maintenance and Construction       | TO | NYSDOT Map Update Provider  |
| NYSP Central Communication/Dispatch       | TO | NYSP Map Update Provider    |
| NYSTA ITS Information Service Provider    | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance and Construction        | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance Management System       | TO | NYSTA Map Update Provider   |
| NYSTA Statewide Operations Center         | TO | NYSTA Map Update Provider   |
| PART Bus System                           | TO | Transit Map Update Provider |
| Rockland TOR                              | TO | Transit Map Update Provider |
| Bee-Line Bus Operations Dispatch System   | TO | Transit Map Update Provider |
| Bee-Line Data Management System           | TO | Transit Map Update Provider |
| Dutchess LOOP Bus Dispatch System         | TO | Transit Map Update Provider |
| HVTMC Freeway Management System           | TO | NYSDOT Map Update Provider  |
| HVTMC ITS Information Service Provider    | TO | NYSDOT Map Update Provider  |
| Metro North Rail Operation Control Center | TO | Transit Map Update Provider |
| NYSDOT Maintenance and Construction       | TO | NYSDOT Map Update Provider  |
| NYSP Central Communication/Dispatch       | TO | NYSP Map Update Provider    |
| NYSTA ITS Information Service Provider    | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance and Construction        | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance Management System       | TO | NYSTA Map Update Provider   |
| NYSTA Statewide Operations Center         | TO | NYSTA Map Update Provider   |
| PART Bus System                           | TO | Transit Map Update Provider |
| Rockland TOR                              | TO | Transit Map Update Provider |
| Bee-Line Bus Operations Dispatch System   | TO | Transit Map Update Provider |
| Bee-Line Data Management System           | TO | Transit Map Update Provider |
| Dutchess LOOP Bus Dispatch System         | TO | Transit Map Update Provider |
| HVTMC Freeway Management System           | TO | NYSDOT Map Update Provider  |
| HVTMC ITS Information Service Provider    | TO | NYSDOT Map Update Provider  |
| Metro North Rail Operation Control Center | TO | Transit Map Update Provider |
| NYSDOT Maintenance and Construction       | TO | NYSDOT Map Update Provider  |
| NYSP Central Communication/Dispatch       | TO | NYSP Map Update Provider    |
| NYSTA ITS Information Service Provider    | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance and Construction        | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance Management System       | TO | NYSTA Map Update Provider   |
| NYSTA Statewide Operations Center         | TO | NYSTA Map Update Provider   |
| PART Bus System                           | TO | Transit Map Update Provider |
| Rockland TOR                              | TO | Transit Map Update Provider |
| Bee-Line Bus Operations Dispatch System   | TO | Transit Map Update Provider |
| Bee-Line Data Management System           | TO | Transit Map Update Provider |
| Dutchess LOOP Bus Dispatch System         | TO | Transit Map Update Provider |
| HVTMC Freeway Management System           | TO | NYSDOT Map Update Provider  |
| HVTMC ITS Information Service Provider    | TO | NYSDOT Map Update Provider  |
| Metro North Rail Operation Control Center | TO | Transit Map Update Provider |
| NYSDOT Maintenance and Construction       | TO | NYSDOT Map Update Provider  |
| NYSP Central Communication/Dispatch       | TO | NYSP Map Update Provider    |
| NYSTA ITS Information Service Provider    | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance and Construction        | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance Management System       | TO | NYSTA Map Update Provider   |
| NYSTA Statewide Operations Center         | TO | NYSTA Map Update Provider   |
| PART Bus System                           | TO | Transit Map Update Provider |

|   |    |                             |
|---|----|-----------------------------|
| Rockland TOR                              | TO | Transit Map Update Provider |
| Bee-Line Bus Operations Dispatch System   | TO | Transit Map Update Provider |
| Bee-Line Data Management System           | TO | Transit Map Update Provider |
| Dutchess LOOP Bus Dispatch System         | TO | Transit Map Update Provider |
| HVTMC Freeway Management System           | TO | NYSDOT Map Update Provider  |
| HVTMC ITS Information Service Provider    | TO | NYSDOT Map Update Provider  |
| Metro North Rail Operation Control Center | TO | Transit Map Update Provider |
| NYSDOT Maintenance and Construction       | TO | NYSDOT Map Update Provider  |
| NYSP Central Communication/Dispatch       | TO | NYSP Map Update Provider    |
| NYSTA ITS Information Service Provider    | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance and Construction        | TO | NYSTA Map Update Provider   |
| NYSTA Maintenance Management System       | TO | NYSTA Map Update Provider   |
| NYSTA Statewide Operations Center         | TO | NYSTA Map Update Provider   |
| PART Bus System                           | TO | Transit Map Update Provider |
| Rockland TOR                              | TO | Transit Map Update Provider |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)



|                             |  |
|-----------------------------|--|
| NYSTA Map Update Provider   | TO NYSTA Maintenance Management System       |
| NYSTA Map Update Provider   | TO NYSTA Statewide Operations Center         |
| NYSTA Map Update Provider   | TO NYSTA ITS Information Service Provider    |
| NYSTA Map Update Provider   | TO NYSTA Maintenance and Construction        |
| NYSTA Map Update Provider   | TO NYSTA Maintenance Management System       |
| NYSTA Map Update Provider   | TO NYSTA Statewide Operations Center         |
| NYSTA Map Update Provider   | TO NYSTA ITS Information Service Provider    |
| NYSTA Map Update Provider   | TO NYSTA Maintenance and Construction        |
| NYSTA Map Update Provider   | TO NYSTA Maintenance Management System       |
| NYSTA Map Update Provider   | TO NYSTA Statewide Operations Center         |
| NYSTA Map Update Provider   | TO NYSTA ITS Information Service Provider    |
| NYSTA Map Update Provider   | TO NYSTA Maintenance and Construction        |
| NYSTA Map Update Provider   | TO NYSTA Maintenance Management System       |
| NYSTA Map Update Provider   | TO NYSTA Statewide Operations Center         |
| NYSTA Map Update Provider   | TO NYSTA ITS Information Service Provider    |
| NYSTA Map Update Provider   | TO NYSTA Maintenance and Construction        |
| NYSTA Map Update Provider   | TO NYSTA Maintenance Management System       |
| NYSTA Map Update Provider   | TO NYSTA Statewide Operations Center         |
| Transit Map Update Provider | TO Bee-Line Bus Operations Dispatch System   |
| Transit Map Update Provider | TO Bee-Line Data Management System           |
| Transit Map Update Provider | TO Dutchess LOOP Bus Dispatch System         |
| Transit Map Update Provider | TO Metro North Rail Operation Control Center |
| Transit Map Update Provider | TO PART Bus System                           |
| Transit Map Update Provider | TO Rockland TOR                              |
| Transit Map Update Provider | TO Bee-Line Bus Operations Dispatch System   |
| Transit Map Update Provider | TO Bee-Line Data Management System           |
| Transit Map Update Provider | TO Dutchess LOOP Bus Dispatch System         |
| Transit Map Update Provider | TO Metro North Rail Operation Control Center |
| Transit Map Update Provider | TO PART Bus System                           |
| Transit Map Update Provider | TO Rockland TOR                              |
| Transit Map Update Provider | TO Bee-Line Bus Operations Dispatch System   |
| Transit Map Update Provider | TO Bee-Line Data Management System           |
| Transit Map Update Provider | TO Dutchess LOOP Bus Dispatch System         |
| Transit Map Update Provider | TO Metro North Rail Operation Control Center |
| Transit Map Update Provider | TO PART Bus System                           |
| Transit Map Update Provider | TO Rockland TOR                              |
| Transit Map Update Provider | TO Bee-Line Bus Operations Dispatch System   |
| Transit Map Update Provider | TO Bee-Line Data Management System           |
| Transit Map Update Provider | TO Dutchess LOOP Bus Dispatch System         |
| Transit Map Update Provider | TO Metro North Rail Operation Control Center |
| Transit Map Update Provider | TO PART Bus System                           |
| Transit Map Update Provider | TO Rockland TOR                              |
| Transit Map Update Provider | TO Bee-Line Bus Operations Dispatch System   |
| Transit Map Update Provider | TO Bee-Line Data Management System           |
| Transit Map Update Provider | TO Dutchess LOOP Bus Dispatch System         |

|                             |  |
|-----------------------------|--|
| Transit Map Update Provider | TO Metro North Rail Operation Control Center |
| Transit Map Update Provider | TO PART Bus System                           |
| Transit Map Update Provider | TO Rockland TOR                              |
| Transit Map Update Provider | TO Bee-Line Bus Operations Dispatch System   |
| Transit Map Update Provider | TO Bee-Line Data Management System           |
| Transit Map Update Provider | TO Dutchess LOOP Bus Dispatch System         |
| Transit Map Update Provider | TO Metro North Rail Operation Control Center |
| Transit Map Update Provider | TO PART Bus System                           |
| Transit Map Update Provider | TO Rockland TOR                              |
| Transit Map Update Provider | TO Bee-Line Bus Operations Dispatch System   |
| Transit Map Update Provider | TO Bee-Line Data Management System           |
| Transit Map Update Provider | TO Dutchess LOOP Bus Dispatch System         |
| Transit Map Update Provider | TO Metro North Rail Operation Control Center |
| Transit Map Update Provider | TO PART Bus System                           |
| Transit Map Update Provider | TO Rockland TOR                              |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

## Architecture Flow

media information request

Media To Emergency Management

### **Inventory**

|   |    |   |
|---|----|---|
| Media Traffic and Travel Information System | TO | Bee-Line Bus Operations Dispatch System   |
| Media Traffic and Travel Information System | TO | Bee-Line Bus Operations Dispatch System   |
| Media Traffic and Travel Information System | TO | Bee-Line Bus Operations Dispatch System   |
| Media Traffic and Travel Information System | TO | City / Local Transit Operations           |
| Media Traffic and Travel Information System | TO | City / Local Transit Operations           |
| Media Traffic and Travel Information System | TO | City / Local Transit Operations           |
| Media Traffic and Travel Information System | TO | Dutchess LOOP Bus Dispatch System         |
| Media Traffic and Travel Information System | TO | Dutchess LOOP Bus Dispatch System         |
| Media Traffic and Travel Information System | TO | Dutchess LOOP Bus Dispatch System         |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System           |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System           |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System           |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | Local Emergency Dispatch                  |
| Media Traffic and Travel Information System | TO | Local Emergency Dispatch                  |
| Media Traffic and Travel Information System | TO | Local Emergency Dispatch                  |
| Media Traffic and Travel Information System | TO | Metro North Rail Operation Control Center |
| Media Traffic and Travel Information System | TO | Metro North Rail Operation Control Center |
| Media Traffic and Travel Information System | TO | Metro North Rail Operation Control Center |
| Media Traffic and Travel Information System | TO | MTA Police                                |
| Media Traffic and Travel Information System | TO | MTA Police                                |
| Media Traffic and Travel Information System | TO | MTA Police                                |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                   |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                   |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                   |
| Media Traffic and Travel Information System | TO | NYSP Central Communication/Dispatch       |
| Media Traffic and Travel Information System | TO | NYSP Central Communication/Dispatch       |
| Media Traffic and Travel Information System | TO | NYSP Central Communication/Dispatch       |
| Media Traffic and Travel Information System | TO | NYSTA Central Communications/Dispatch     |
| Media Traffic and Travel Information System | TO | NYSTA Central Communications/Dispatch     |
| Media Traffic and Travel Information System | TO | NYSTA Central Communications/Dispatch     |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center         |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center         |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center         |
| Media Traffic and Travel Information System | TO | PART Bus System                           |
| Media Traffic and Travel Information System | TO | PART Bus System                           |
| Media Traffic and Travel Information System | TO | PART Bus System                           |
| Media Traffic and Travel Information System | TO | Rockland TOR                              |
| Media Traffic and Travel Information System | TO | Rockland TOR                              |
| Media Traffic and Travel Information System | TO | Rockland TOR                              |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center    |



|   |    |   |
|---|----|---|
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center    |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center    |
| Media Traffic and Travel Information System | TO | Bee-Line Bus Operations Dispatch System   |
| Media Traffic and Travel Information System | TO | Bee-Line Bus Operations Dispatch System   |
| Media Traffic and Travel Information System | TO | Bee-Line Bus Operations Dispatch System   |
| Media Traffic and Travel Information System | TO | Bee-Line Bus Operations Dispatch System   |
| Media Traffic and Travel Information System | TO | Bee-Line Bus Operations Dispatch System   |
| Media Traffic and Travel Information System | TO | City / Local Transit Operations           |
| Media Traffic and Travel Information System | TO | City / Local Transit Operations           |
| Media Traffic and Travel Information System | TO | City / Local Transit Operations           |
| Media Traffic and Travel Information System | TO | City / Local Transit Operations           |
| Media Traffic and Travel Information System | TO | City / Local Transit Operations           |
| Media Traffic and Travel Information System | TO | Dutchess LOOP Bus Dispatch System         |
| Media Traffic and Travel Information System | TO | Dutchess LOOP Bus Dispatch System         |
| Media Traffic and Travel Information System | TO | Dutchess LOOP Bus Dispatch System         |
| Media Traffic and Travel Information System | TO | Dutchess LOOP Bus Dispatch System         |
| Media Traffic and Travel Information System | TO | Dutchess LOOP Bus Dispatch System         |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System           |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System           |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System           |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System           |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System           |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | Local Emergency Dispatch                  |
| Media Traffic and Travel Information System | TO | Local Emergency Dispatch                  |
| Media Traffic and Travel Information System | TO | Local Emergency Dispatch                  |
| Media Traffic and Travel Information System | TO | Local Emergency Dispatch                  |
| Media Traffic and Travel Information System | TO | Local Emergency Dispatch                  |
| Media Traffic and Travel Information System | TO | Metro North Rail Operation Control Center |
| Media Traffic and Travel Information System | TO | Metro North Rail Operation Control Center |
| Media Traffic and Travel Information System | TO | Metro North Rail Operation Control Center |
| Media Traffic and Travel Information System | TO | Metro North Rail Operation Control Center |
| Media Traffic and Travel Information System | TO | Metro North Rail Operation Control Center |
| Media Traffic and Travel Information System | TO | MTA Police                                |
| Media Traffic and Travel Information System | TO | MTA Police                                |
| Media Traffic and Travel Information System | TO | MTA Police                                |
| Media Traffic and Travel Information System | TO | MTA Police                                |
| Media Traffic and Travel Information System | TO | MTA Police                                |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                   |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                   |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                   |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                   |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                   |
| Media Traffic and Travel Information System | TO | NYSP Central Communication/Dispatch       |
| Media Traffic and Travel Information System | TO | NYSP Central Communication/Dispatch       |
| Media Traffic and Travel Information System | TO | NYSP Central Communication/Dispatch       |
| Media Traffic and Travel Information System | TO | NYSP Central Communication/Dispatch       |

|   |    |   |
|---|----|---|
| Media Traffic and Travel Information System | TO | NYSP Central Communication/Dispatch       |
| Media Traffic and Travel Information System | TO | NYSTA Central Communications/Dispatch     |
| Media Traffic and Travel Information System | TO | NYSTA Central Communications/Dispatch     |
| Media Traffic and Travel Information System | TO | NYSTA Central Communications/Dispatch     |
| Media Traffic and Travel Information System | TO | NYSTA Central Communications/Dispatch     |
| Media Traffic and Travel Information System | TO | NYSTA Central Communications/Dispatch     |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center         |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center         |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center         |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center         |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center         |
| Media Traffic and Travel Information System | TO | PART Bus System                           |
| Media Traffic and Travel Information System | TO | PART Bus System                           |
| Media Traffic and Travel Information System | TO | PART Bus System                           |
| Media Traffic and Travel Information System | TO | PART Bus System                           |
| Media Traffic and Travel Information System | TO | PART Bus System                           |
| Media Traffic and Travel Information System | TO | Rockland TOR                              |
| Media Traffic and Travel Information System | TO | Rockland TOR                              |
| Media Traffic and Travel Information System | TO | Rockland TOR                              |
| Media Traffic and Travel Information System | TO | Rockland TOR                              |
| Media Traffic and Travel Information System | TO | Rockland TOR                              |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center    |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center    |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center    |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center    |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center    |
| Media Traffic and Travel Information System | TO | Bee-Line Bus Operations Dispatch System   |
| Media Traffic and Travel Information System | TO | Bee-Line Bus Operations Dispatch System   |
| Media Traffic and Travel Information System | TO | Bee-Line Bus Operations Dispatch System   |
| Media Traffic and Travel Information System | TO | City / Local Transit Operations           |
| Media Traffic and Travel Information System | TO | City / Local Transit Operations           |
| Media Traffic and Travel Information System | TO | City / Local Transit Operations           |
| Media Traffic and Travel Information System | TO | Dutchess LOOP Bus Dispatch System         |
| Media Traffic and Travel Information System | TO | Dutchess LOOP Bus Dispatch System         |
| Media Traffic and Travel Information System | TO | Dutchess LOOP Bus Dispatch System         |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System           |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System           |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System           |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | Local Emergency Dispatch                  |
| Media Traffic and Travel Information System | TO | Local Emergency Dispatch                  |
| Media Traffic and Travel Information System | TO | Local Emergency Dispatch                  |
| Media Traffic and Travel Information System | TO | Metro North Rail Operation Control Center |
| Media Traffic and Travel Information System | TO | Metro North Rail Operation Control Center |

|   |    |   |
|---|----|---|
| Media Traffic and Travel Information System | TO | Metro North Rail Operation Control Center |
| Media Traffic and Travel Information System | TO | MTA Police                                |
| Media Traffic and Travel Information System | TO | MTA Police                                |
| Media Traffic and Travel Information System | TO | MTA Police                                |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                   |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                   |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                   |
| Media Traffic and Travel Information System | TO | NYSP Central Communication/Dispatch       |
| Media Traffic and Travel Information System | TO | NYSP Central Communication/Dispatch       |
| Media Traffic and Travel Information System | TO | NYSP Central Communication/Dispatch       |
| Media Traffic and Travel Information System | TO | NYSTA Central Communications/Dispatch     |
| Media Traffic and Travel Information System | TO | NYSTA Central Communications/Dispatch     |
| Media Traffic and Travel Information System | TO | NYSTA Central Communications/Dispatch     |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center         |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center         |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center         |
| Media Traffic and Travel Information System | TO | PART Bus System                           |
| Media Traffic and Travel Information System | TO | PART Bus System                           |
| Media Traffic and Travel Information System | TO | PART Bus System                           |
| Media Traffic and Travel Information System | TO | Rockland TOR                              |
| Media Traffic and Travel Information System | TO | Rockland TOR                              |
| Media Traffic and Travel Information System | TO | Rockland TOR                              |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center    |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center    |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center    |
| Media Traffic and Travel Information System | TO | Bee-Line Bus Operations Dispatch System   |
| Media Traffic and Travel Information System | TO | Bee-Line Bus Operations Dispatch System   |
| Media Traffic and Travel Information System | TO | Bee-Line Bus Operations Dispatch System   |
| Media Traffic and Travel Information System | TO | Bee-Line Bus Operations Dispatch System   |
| Media Traffic and Travel Information System | TO | City / Local Transit Operations           |
| Media Traffic and Travel Information System | TO | City / Local Transit Operations           |
| Media Traffic and Travel Information System | TO | City / Local Transit Operations           |
| Media Traffic and Travel Information System | TO | City / Local Transit Operations           |
| Media Traffic and Travel Information System | TO | Dutchess LOOP Bus Dispatch System         |
| Media Traffic and Travel Information System | TO | Dutchess LOOP Bus Dispatch System         |
| Media Traffic and Travel Information System | TO | Dutchess LOOP Bus Dispatch System         |
| Media Traffic and Travel Information System | TO | Dutchess LOOP Bus Dispatch System         |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System           |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System           |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System           |
| Media Traffic and Travel Information System | TO | HVTMC Freeway Management System           |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | HVTMC ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | Local Emergency Dispatch                  |
| Media Traffic and Travel Information System | TO | Local Emergency Dispatch                  |
| Media Traffic and Travel Information System | TO | Local Emergency Dispatch                  |

|   |    |   |
|---|----|---|
| Media Traffic and Travel Information System | TO | Local Emergency Dispatch                  |
| Media Traffic and Travel Information System | TO | Metro North Rail Operation Control Center |
| Media Traffic and Travel Information System | TO | Metro North Rail Operation Control Center |
| Media Traffic and Travel Information System | TO | Metro North Rail Operation Control Center |
| Media Traffic and Travel Information System | TO | Metro North Rail Operation Control Center |
| Media Traffic and Travel Information System | TO | MTA Police                                |
| Media Traffic and Travel Information System | TO | MTA Police                                |
| Media Traffic and Travel Information System | TO | MTA Police                                |
| Media Traffic and Travel Information System | TO | MTA Police                                |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                   |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                   |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                   |
| Media Traffic and Travel Information System | TO | NYSBA Operations Center                   |
| Media Traffic and Travel Information System | TO | NYSP Central Communication/Dispatch       |
| Media Traffic and Travel Information System | TO | NYSP Central Communication/Dispatch       |
| Media Traffic and Travel Information System | TO | NYSP Central Communication/Dispatch       |
| Media Traffic and Travel Information System | TO | NYSP Central Communication/Dispatch       |
| Media Traffic and Travel Information System | TO | NYSTA Central Communications/Dispatch     |
| Media Traffic and Travel Information System | TO | NYSTA Central Communications/Dispatch     |
| Media Traffic and Travel Information System | TO | NYSTA Central Communications/Dispatch     |
| Media Traffic and Travel Information System | TO | NYSTA Central Communications/Dispatch     |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | NYSTA ITS Information Service Provider    |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center         |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center         |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center         |
| Media Traffic and Travel Information System | TO | NYSTA Statewide Operations Center         |
| Media Traffic and Travel Information System | TO | PART Bus System                           |
| Media Traffic and Travel Information System | TO | PART Bus System                           |
| Media Traffic and Travel Information System | TO | PART Bus System                           |
| Media Traffic and Travel Information System | TO | PART Bus System                           |
| Media Traffic and Travel Information System | TO | Rockland TOR                              |
| Media Traffic and Travel Information System | TO | Rockland TOR                              |
| Media Traffic and Travel Information System | TO | Rockland TOR                              |
| Media Traffic and Travel Information System | TO | Rockland TOR                              |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center    |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center    |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center    |
| Media Traffic and Travel Information System | TO | TRANSCOM Operations Information Center    |

## Standards

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) TCIP - Common Public Transportation (CPT) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Incident Management (IM) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

(IEEE) Standard for Common Incident Management Message Sets (IMMS) for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

multimodal information

Multimodal Transportation Service Provider To Information Service Provider

### **Inventory**

|  |    |  |
|--|----|--|
| Ferrys, Airports etc Information Systems | TO | HVTMC ITS Information Service Provider |
| Ferrys, Airports etc Information Systems | TO | HVTMC ITS Information Service Provider |
| Ferrys, Airports etc Information Systems | TO | HVTMC ITS Information Service Provider |
| Ferrys, Airports etc Information Systems | TO | HVTMC ITS Information Service Provider |
| Ferrys, Airports etc Information Systems | TO | HVTMC ITS Information Service Provider |

## Standards

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## **Architecture Flow**

multimodal information request

Information Service Provider To Multimodal Transportation Service Provider

### **Inventory**

|  |    |  |
|--|----|--|
| HVTMC ITS Information Service Provider | TO | Ferrys, Airports etc Information Systems |
| HVTMC ITS Information Service Provider | TO | Ferrys, Airports etc Information Systems |
| HVTMC ITS Information Service Provider | TO | Ferrys, Airports etc Information Systems |
| HVTMC ITS Information Service Provider | TO | Ferrys, Airports etc Information Systems |
| HVTMC ITS Information Service Provider | TO | Ferrys, Airports etc Information Systems |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

multimodal service data

### Multimodal Transportation Service Provider To Transit Management

#### **Inventory**

|  |    |   |
|--|----|---|
| Ferrys, Airports etc Information Systems | TO | Bee-Line Bus Operations Dispatch System   |
| Ferrys, Airports etc Information Systems | TO | Bee-Line Bus Operations Dispatch System   |
| Ferrys, Airports etc Information Systems | TO | Bee-Line Bus Operations Dispatch System   |
| Ferrys, Airports etc Information Systems | TO | City / Local Transit Operations           |
| Ferrys, Airports etc Information Systems | TO | City / Local Transit Operations           |
| Ferrys, Airports etc Information Systems | TO | City / Local Transit Operations           |
| Ferrys, Airports etc Information Systems | TO | Dutchess LOOP Bus Dispatch System         |
| Ferrys, Airports etc Information Systems | TO | Dutchess LOOP Bus Dispatch System         |
| Ferrys, Airports etc Information Systems | TO | Dutchess LOOP Bus Dispatch System         |
| Ferrys, Airports etc Information Systems | TO | Metro North Rail Operation Control Center |
| Ferrys, Airports etc Information Systems | TO | Metro North Rail Operation Control Center |
| Ferrys, Airports etc Information Systems | TO | Metro North Rail Operation Control Center |
| Ferrys, Airports etc Information Systems | TO | PART Bus System                           |
| Ferrys, Airports etc Information Systems | TO | PART Bus System                           |
| Ferrys, Airports etc Information Systems | TO | PART Bus System                           |
| Ferrys, Airports etc Information Systems | TO | Rockland TOR                              |
| Ferrys, Airports etc Information Systems | TO | Rockland TOR                              |
| Ferrys, Airports etc Information Systems | TO | Rockland TOR                              |

#### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) TCIP - Control Center (CC) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

## Architecture Flow

payment

### Traveler Card To Vehicle

#### **Inventory**

|                           |    |                          |
|---------------------------|----|--------------------------|
| Transponder Card (EZPass) | TO | NYSBA Toll Tag Interface |
| Transponder Card (EZPass) | TO | NYSTA Toll Tag Interface |

#### **Standards**

None

**Architecture Flow**

payment request

Toll Administration To Financial Institution

**Inventory**

NYSBA Toll Operations TO Commercial Bank

NYSTA Toll Operations TO Commercial Bank

**Standards**

None

**Architecture Flow**

payment violation notification

Parking Management To Enforcement Agency

**Inventory**

NYSBA Toll Operations TO NYSP

NYSTA Toll Operations TO NYSP

NYSBA Toll Operations TO NYSP

NYSTA Toll Operations TO NYSP

NYSBA Toll Operations TO NYSP

NYSBA Toll Operations TO NYSP

NYSTA Toll Operations TO NYSP

NYSTA Toll Operations TO NYSP

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) TCIP - Fare Collection (FC) Business Area Standard (Data Dictionary, Message Set )



## Architecture Flow

personal transit information

Transit Management To Personal Information Access

### **Inventory**

|   |    |  |
|---|----|--|
| Bee-Line Bus Operations Dispatch System | TO | Traveler Cellular and Land-Line Telephones |
| Bee-Line Bus Operations Dispatch System | TO | Traveler Cellular and Land-Line Telephones |
| Bee-Line Bus Operations Dispatch System | TO | Traveler Cellular and Land-Line Telephones |
| Bee-Line Bus Operations Dispatch System | TO | Traveler Cellular and Land-Line Telephones |
| Bee-Line Bus Operations Dispatch System | TO | Traveler Cellular and Land-Line Telephones |
| Bee-Line Bus Operations Dispatch System | TO | Traveler Cellular and Land-Line Telephones |
| Bee-Line Bus Operations Dispatch System | TO | Traveler Cellular and Land-Line Telephones |

### **Standards**

(AASHTO/ITE/NEMA) TCIP - Common Public Transportation (CPT) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Passenger Information (PI) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

position fix

Location Data Source To Vehicle

### **Inventory**

|  |    |  |
|--|----|--|
| Device That Provides Accurate Position Information | TO | System That Provides Accurate Position Information |
|--|----|--|

### **Standards**

None

## Architecture Flow

provider profile confirm

Information Service Provider To Yellow Pages Service Providers

### **Inventory**

|  |    |                                      |
|--|----|--------------------------------------|
| HVTMC ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| HVTMC ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| HVTMC ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| HVTMC ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| HVTMC ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSBA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSBA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSBA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSBA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSBA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSTA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSTA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSTA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSTA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSTA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| Other Privatized ISPs                              | TO | Tourist Information Provider Systems |
| Other Privatized ISPs                              | TO | Tourist Information Provider Systems |
| Other Privatized ISPs                              | TO | Tourist Information Provider Systems |
| Other Privatized ISPs                              | TO | Tourist Information Provider Systems |
| Other Privatized ISPs                              | TO | Tourist Information Provider Systems |
| SATIN (Service Area Travelers Interactive Network) | TO | Tourist Information Provider Systems |
| SATIN (Service Area Travelers Interactive Network) | TO | Tourist Information Provider Systems |
| SATIN (Service Area Travelers Interactive Network) | TO | Tourist Information Provider Systems |
| SATIN (Service Area Travelers Interactive Network) | TO | Tourist Information Provider Systems |
| SATIN (Service Area Travelers Interactive Network) | TO | Tourist Information Provider Systems |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

**Architecture Flow**

provider profile data

Yellow Pages Service Providers To Information Service Provider

**Inventory**

|                                      |    |  |
|--------------------------------------|----|--|
| Tourist Information Provider Systems | TO | HVTMC ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | HVTMC ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | HVTMC ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | HVTMC ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | HVTMC ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSBA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSBA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSBA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSBA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSBA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSBA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSBA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSTA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSTA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSTA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSTA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSTA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSTA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | Other Privatized ISPs                              |
| Tourist Information Provider Systems | TO | Other Privatized ISPs                              |
| Tourist Information Provider Systems | TO | Other Privatized ISPs                              |
| Tourist Information Provider Systems | TO | Other Privatized ISPs                              |
| Tourist Information Provider Systems | TO | Other Privatized ISPs                              |
| Tourist Information Provider Systems | TO | Other Privatized ISPs                              |
| Tourist Information Provider Systems | TO | SATIN (Service Area Travelers Interactive Network) |
| Tourist Information Provider Systems | TO | SATIN (Service Area Travelers Interactive Network) |
| Tourist Information Provider Systems | TO | SATIN (Service Area Travelers Interactive Network) |
| Tourist Information Provider Systems | TO | SATIN (Service Area Travelers Interactive Network) |
| Tourist Information Provider Systems | TO | SATIN (Service Area Travelers Interactive Network) |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

**Architecture Flow**

railroad advisories

Rail Operations To Traffic Management

**Inventory**

Metro North Rail Operations TO HVTMC Freeway Management System

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

railroad schedules

Rail Operations To Maintenance and Construction Management

**Inventory**

Metro North Rail Operations TO HVTMC Freeway Management System

Metro North Rail Operations TO HVTMC Freeway Management System

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

registration

DMV To Toll Administration

**Inventory**

Vehicle Title and Registration Division TO NYSBA Toll Operations

Vehicle Title and Registration Division TO NYSTA Toll Operations

**Standards**

None

## **Architecture Flow**

remote surveillance control

Emergency Management To Traffic Management

## **Inventory**

|                                     |    |                                 |
|-------------------------------------|----|---------------------------------|
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |

## **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

## Architecture Flow

request fare and price information

Traffic Management To Information Service Provider

### **Inventory**

|  |    |  |
|--|----|--|
| HVTMC Freeway Management System        | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System        | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System        | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System        | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System        | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System        | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System        | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System        | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System        | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System        | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center                | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center                | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center                | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center                | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center                | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center                | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center                | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center                | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center                | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSBA Satellite Operations Centers     | TO | NYSBA ITS Information Service Provider             |
| NYSBA Satellite Operations Centers     | TO | NYSBA ITS Information Service Provider             |
| NYSBA Satellite Operations Centers     | TO | NYSBA ITS Information Service Provider             |
| NYSBA Satellite Operations Centers     | TO | NYSBA ITS Information Service Provider             |
| NYSBA Satellite Operations Centers     | TO | NYSBA ITS Information Service Provider             |
| NYSTA Statewide Operations Center      | TO | NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center      | TO | NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center      | TO | NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center      | TO | NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center      | TO | NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center      | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center      | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center      | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center      | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center      | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |

|  |    |  |
|--|----|--|
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

**Architecture Flow**

request for bad tag list

Transit Vehicle Subsystem To Transit Management

**Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Vehicles IT Equipment      | TO | Bee-Line Bus Operations Dispatch System   |
| Dutchess LOOP Bus Vehicles IT Equipment | TO | Dutchess LOOP Bus Dispatch System         |
| Metro North Rail Vehicles IT Equipment  | TO | Metro North Rail Operation Control Center |
| PART Bus Vehicles IT Equipment          | TO | PART Bus System                           |
| Rockland TOR Bus Vehicles IT Equipment  | TO | Rockland TOR                              |

**Standards**

None

**Architecture Flow**

request for enforcement

Maintenance and Construction Management To Enforcement Agency

**Inventory**

|                                     |    |      |
|-------------------------------------|----|------|
| HVTMC Freeway Management System     | TO | NYSP |
| NYSBA Maintenance and Construction  | TO | NYSP |
| NYSDOT Maintenance and Construction | TO | NYSP |
| NYSTA Maintenance and Construction  | TO | NYSP |
| HVTMC Freeway Management System     | TO | NYSP |
| NYSBA Maintenance and Construction  | TO | NYSP |
| NYSDOT Maintenance and Construction | TO | NYSP |
| NYSTA Maintenance and Construction  | TO | NYSP |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

request for payment

Vehicle To Traveler Card

**Inventory**

|                          |    |                           |
|--------------------------|----|---------------------------|
| NYSBA Toll Tag Interface | TO | Transponder Card (EZPass) |
| NYSTA Toll Tag Interface | TO | Transponder Card (EZPass) |

**Standards**

None



## Architecture Flow

request for right-of-way

Roadway Subsystem To Traffic Management

### **Inventory**

|                                     |    |  |
|-------------------------------------|----|--|
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System       |
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System       |
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System       |
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System       |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System     |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System     |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System     |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |

### **Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Object Definitions for Actuated Traffic Signal Controller Units (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) Objects for Signal Control Priority (Data Dictionary, Message Set )

## Architecture Flow

request for road network conditions

Information Service Provider To Traffic Management

### **Inventory**

|   |    |  |
|---|----|--|
| Bee-Line Bus Operations Dispatch System | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider  | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider  | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider  | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider  | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider  | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider  | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider  | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider  | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network        | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network        | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network        | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network        | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network        | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network        | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network        | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network        | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network        | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network        | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network        | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network        | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network        | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network        | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network        | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network        | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network        | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network        | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network        | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network        | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network        | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network        | TO | TRANSCOM Operations Information Center |
| IRVN Video Network                      | TO | HVTMC Freeway Management System        |
| IRVN Video Network                      | TO | HVTMC Freeway Management System        |
| IRVN Video Network                      | TO | HVTMC Freeway Management System        |
| IRVN Video Network                      | TO | HVTMC Freeway Management System        |
| IRVN Video Network                      | TO | HVTMC Freeway Management System        |
| IRVN Video Network                      | TO | HVTMC Freeway Management System        |
| IRVN Video Network                      | TO | HVTMC Freeway Management System        |
| IRVN Video Network                      | TO | HVTMC Freeway Management System        |
| IRVN Video Network                      | TO | NYSBA Operations Center                |
| IRVN Video Network                      | TO | NYSBA Operations Center                |
| IRVN Video Network                      | TO | NYSBA Operations Center                |
| IRVN Video Network                      | TO | NYSBA Operations Center                |

|  |   |
|--|---|
| IRVN Video Network                     | TO NYSBA Operations Center                |
| IRVN Video Network                     | TO NYSBA Operations Center                |
| IRVN Video Network                     | TO NYSBA Operations Center                |
| IRVN Video Network                     | TO NYSTA Statewide Operations Center      |
| IRVN Video Network                     | TO NYSTA Statewide Operations Center      |
| IRVN Video Network                     | TO NYSTA Statewide Operations Center      |
| IRVN Video Network                     | TO NYSTA Statewide Operations Center      |
| IRVN Video Network                     | TO NYSTA Statewide Operations Center      |
| IRVN Video Network                     | TO NYSTA Statewide Operations Center      |
| IRVN Video Network                     | TO NYSTA Statewide Operations Center      |
| IRVN Video Network                     | TO TRANSCOM Operations Information Center |
| IRVN Video Network                     | TO TRANSCOM Operations Information Center |
| IRVN Video Network                     | TO TRANSCOM Operations Information Center |
| IRVN Video Network                     | TO TRANSCOM Operations Information Center |
| IRVN Video Network                     | TO TRANSCOM Operations Information Center |
| IRVN Video Network                     | TO TRANSCOM Operations Information Center |
| IRVN Video Network                     | TO TRANSCOM Operations Information Center |
| NYSBA ITS Information Service Provider | TO NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO NYSBA Satellite Operations Centers     |
| NYSTA ITS Information Service Provider | TO NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider | TO NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider | TO NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider | TO NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider | TO NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider | TO NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider | TO NYSTA Statewide Operations Center      |
| Other Privatized ISPs                  | TO TRANSCOM Operations Information Center |
| Other Privatized ISPs                  | TO TRANSCOM Operations Information Center |
| Other Privatized ISPs                  | TO TRANSCOM Operations Information Center |
| Other Privatized ISPs                  | TO TRANSCOM Operations Information Center |
| Other Privatized ISPs                  | TO TRANSCOM Operations Information Center |
| Other Privatized ISPs                  | TO TRANSCOM Operations Information Center |
| Other Privatized ISPs                  | TO TRANSCOM Operations Information Center |
| PART Bus System                        | TO HVTMC Freeway Management System        |
| PART Bus System                        | TO HVTMC Freeway Management System        |
| PART Bus System                        | TO HVTMC Freeway Management System        |
| PART Bus System                        | TO HVTMC Freeway Management System        |
| PART Bus System                        | TO HVTMC Freeway Management System        |
| PART Bus System                        | TO HVTMC Freeway Management System        |

|  |    |  |
|--|----|--|
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |

|  |    |  |
|--|----|--|
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IRVN Video Network                                 | TO | HVTMC Freeway Management System        |
| IRVN Video Network                                 | TO | HVTMC Freeway Management System        |
| IRVN Video Network                                 | TO | HVTMC Freeway Management System        |
| IRVN Video Network                                 | TO | HVTMC Freeway Management System        |
| IRVN Video Network                                 | TO | HVTMC Freeway Management System        |
| IRVN Video Network                                 | TO | HVTMC Freeway Management System        |
| IRVN Video Network                                 | TO | HVTMC Freeway Management System        |
| IRVN Video Network                                 | TO | NYSBA Operations Center                |
| IRVN Video Network                                 | TO | NYSBA Operations Center                |
| IRVN Video Network                                 | TO | NYSBA Operations Center                |
| IRVN Video Network                                 | TO | NYSBA Operations Center                |
| IRVN Video Network                                 | TO | NYSBA Operations Center                |
| IRVN Video Network                                 | TO | NYSBA Operations Center                |

|  |   |
|--|---|
| IRVN Video Network                     | TO NYSBA Operations Center                |
| IRVN Video Network                     | TO NYSTA Statewide Operations Center      |
| IRVN Video Network                     | TO NYSTA Statewide Operations Center      |
| IRVN Video Network                     | TO NYSTA Statewide Operations Center      |
| IRVN Video Network                     | TO NYSTA Statewide Operations Center      |
| IRVN Video Network                     | TO NYSTA Statewide Operations Center      |
| IRVN Video Network                     | TO NYSTA Statewide Operations Center      |
| IRVN Video Network                     | TO NYSTA Statewide Operations Center      |
| IRVN Video Network                     | TO NYSTA Statewide Operations Center      |
| IRVN Video Network                     | TO TRANSCOM Operations Information Center |
| IRVN Video Network                     | TO TRANSCOM Operations Information Center |
| IRVN Video Network                     | TO TRANSCOM Operations Information Center |
| IRVN Video Network                     | TO TRANSCOM Operations Information Center |
| IRVN Video Network                     | TO TRANSCOM Operations Information Center |
| IRVN Video Network                     | TO TRANSCOM Operations Information Center |
| IRVN Video Network                     | TO TRANSCOM Operations Information Center |
| NYSBA ITS Information Service Provider | TO NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO NYSBA Satellite Operations Centers     |
| NYSTA ITS Information Service Provider | TO NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider | TO NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider | TO NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider | TO NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider | TO NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider | TO NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider | TO NYSTA Statewide Operations Center      |
| Other Privatized ISPs                  | TO TRANSCOM Operations Information Center |
| Other Privatized ISPs                  | TO TRANSCOM Operations Information Center |
| Other Privatized ISPs                  | TO TRANSCOM Operations Information Center |
| Other Privatized ISPs                  | TO TRANSCOM Operations Information Center |
| Other Privatized ISPs                  | TO TRANSCOM Operations Information Center |
| Other Privatized ISPs                  | TO TRANSCOM Operations Information Center |
| Other Privatized ISPs                  | TO TRANSCOM Operations Information Center |
| PART Bus System                        | TO HVTMC Freeway Management System        |
| PART Bus System                        | TO HVTMC Freeway Management System        |
| PART Bus System                        | TO HVTMC Freeway Management System        |
| PART Bus System                        | TO HVTMC Freeway Management System        |
| PART Bus System                        | TO HVTMC Freeway Management System        |
| PART Bus System                        | TO HVTMC Freeway Management System        |
| PART Bus System                        | TO HVTMC Freeway Management System        |
| Rockland TOR                           | TO HVTMC Freeway Management System        |

|  |    |  |
|--|----|--|
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |

SATIN (Service Area Travelers Interactive Network) TO TRANSCOM Operations Information Center

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

### **Architecture Flow**

request for vehicle measures

Transit Management To Transit Vehicle Subsystem

### **Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles IT Equipment      |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles IT Equipment      |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles IT Equipment |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles IT Equipment |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles IT Equipment  |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles IT Equipment  |
| PART Bus System                           | TO | PART Bus Vehicles IT Equipment          |
| PART Bus System                           | TO | PART Bus Vehicles IT Equipment          |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles IT Equipment  |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicles IT Equipment  |

### **Standards**

(AASHTO/ITE/NEMA) TCIP - Control Center (CC) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )



## Architecture Flow

request tag data

Commercial Vehicle Check To Commercial Vehicle Subsystem

### **Inventory**

|  |    |                                |
|--|----|--------------------------------|
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface       |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface       |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface       |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface       |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface       |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface       |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface       |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface       |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface       |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface       |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface       |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface       |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface       |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface       |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |

|  |    |                                |
|--|----|--------------------------------|
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| NYSTA Toll Collection Equipment            | TO | NYSTA Toll Tag Interface       |
| NYSTA Toll Collection Equipment            | TO | NYSTA Toll Tag Interface       |
| NYSTA Toll Collection Equipment            | TO | NYSTA Toll Tag Interface       |
| NYSTA Toll Collection Equipment            | TO | NYSTA Toll Tag Interface       |
| NYSTA Toll Collection Equipment            | TO | NYSTA Toll Tag Interface       |
| NYSTA Toll Collection Equipment            | TO | NYSTA Toll Tag Interface       |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment                       | TO | NYSTA DSRC Receiving Equipment |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |
| TRANSMIT Travel Time System                | TO | TRANSMIT Probe Interface       |

**Standards**

(ASTM) Specification for Dedicated Short Range Communication (DSRC) Data Link Layer: Medium Access and Logical Link Control (Communications Protocol)

(ASTM) Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz (Communications Protocol)

(ASTM) Standard Specification for 5.9 GHz Data Link Layer (Communications Protocol)

(ASTM) Standard Specification for 5.9 GHz Physical Layer (Communications Protocol)

(IEEE) Security/Privacy of Vehicle/RS Communications including Smart Card Communications ( )

(IEEE) Standard for Message Sets for Vehicle/Roadside Communications (Data Dictionary, Message Set )

**Architecture Flow**

request transit information

Traffic Management To Transit Management

**Inventory**

|                                 |    |   |
|---------------------------------|----|---|
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System   |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center |
| HVTMC Freeway Management System | TO | PART Bus System                           |
| HVTMC Freeway Management System | TO | Rockland TOR                              |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

resource deployment status

Traffic Management To Emergency Management

**Inventory**

|                                 |    |                                     |
|---------------------------------|----|-------------------------------------|
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Common Incident Management Message Sets (IMMS) for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(IEEE) Standard for Traffic Incident Management Message Sets for Use by EMCs (Data Dictionary, Message Set )

## **Architecture Flow**

resource request

Emergency Management To Traffic Management

### **Inventory**

|                                     |    |                                 |
|-------------------------------------|----|---------------------------------|
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |
| NYSP Central Communication/Dispatch | TO | HVTMC Freeway Management System |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Common Incident Management Message Sets (IMMS) for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

(IEEE) Standard for Traffic Incident Management Message Sets for Use by EMCs (Data Dictionary, Message Set )

## Architecture Flow

reversible lane status

### Roadway Subsystem To Traffic Management

#### **Inventory**

|                                     |    |  |
|-------------------------------------|----|--|
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System       |
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System       |
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System       |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System     |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System     |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |

#### **Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Transportation System Sensor Objects (Data Dictionary, Message Set )

## Architecture Flow

road data

### Maintenance and Construction Management To Surface Transportation Weather Service

#### **Inventory**

|                                     |    |   |
|-------------------------------------|----|---|
| NYSDOT Maintenance and Construction | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction  | TO | NYSTA Street Surface Weather Condition Modeling System  |

#### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

## Architecture Flow

road network conditions

Information Service Provider To Fleet and Freight Management

### **Inventory**

|                                 |    |   |
|---------------------------------|----|---|
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System     |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System     |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System     |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System     |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System     |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider      |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider      |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider      |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider      |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider      |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network            |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network            |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network            |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network            |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network            |
| HVTMC Freeway Management System | TO | IRVN Video Network                          |
| HVTMC Freeway Management System | TO | IRVN Video Network                          |
| HVTMC Freeway Management System | TO | IRVN Video Network                          |
| HVTMC Freeway Management System | TO | IRVN Video Network                          |
| HVTMC Freeway Management System | TO | IRVN Video Network                          |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction          |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction          |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction          |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction          |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction          |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center   |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center   |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center   |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center   |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center   |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction         |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction         |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction         |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction         |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction         |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction         |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch         |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch         |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch         |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch         |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch         |
| HVTMC Freeway Management System | TO | PART Bus System                             |

|                                    |   |
|------------------------------------|---|
| HVTMC Freeway Management System    | TO PART Bus System                                    |
| HVTMC Freeway Management System    | TO PART Bus System                                    |
| HVTMC Freeway Management System    | TO PART Bus System                                    |
| HVTMC Freeway Management System    | TO PART Bus System                                    |
| HVTMC Freeway Management System    | TO Rockland TOR                                       |
| HVTMC Freeway Management System    | TO Rockland TOR                                       |
| HVTMC Freeway Management System    | TO Rockland TOR                                       |
| HVTMC Freeway Management System    | TO Rockland TOR                                       |
| HVTMC Freeway Management System    | TO Rockland TOR                                       |
| HVTMC Freeway Management System    | TO SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System    | TO SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System    | TO SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System    | TO SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System    | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center            | TO IRVN Video Network                                 |
| NYSBA Operations Center            | TO IRVN Video Network                                 |
| NYSBA Operations Center            | TO IRVN Video Network                                 |
| NYSBA Operations Center            | TO IRVN Video Network                                 |
| NYSBA Operations Center            | TO IRVN Video Network                                 |
| NYSBA Operations Center            | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center            | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center            | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center            | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center            | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center            | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center            | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center            | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center            | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center            | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center            | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center            | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center            | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center            | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center            | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center            | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center            | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center            | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center            | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center            | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center            | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Satellite Operations Centers | TO NYSBA ITS Information Service Provider             |
| NYSBA Satellite Operations Centers | TO NYSBA ITS Information Service Provider             |
| NYSBA Satellite Operations Centers | TO NYSBA ITS Information Service Provider             |
| NYSBA Satellite Operations Centers | TO NYSBA ITS Information Service Provider             |
| NYSBA Satellite Operations Centers | TO NYSBA ITS Information Service Provider             |
| NYSBA Satellite Operations Centers | TO NYSBA Maintenance and Construction                 |

|  |    |  |
|--|----|--|
| NYSBA Satellite Operations Centers     | TO | NYSBA Maintenance and Construction                 |
| NYSBA Satellite Operations Centers     | TO | NYSBA Maintenance and Construction                 |
| NYSBA Satellite Operations Centers     | TO | NYSBA Maintenance and Construction                 |
| NYSBA Satellite Operations Centers     | TO | NYSBA Maintenance and Construction                 |
| NYSTA Statewide Operations Center      | TO | IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center      | TO | IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center      | TO | IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center      | TO | IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center      | TO | IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center      | TO | IRVN Video Network                                 |
| NYSTA Statewide Operations Center      | TO | IRVN Video Network                                 |
| NYSTA Statewide Operations Center      | TO | IRVN Video Network                                 |
| NYSTA Statewide Operations Center      | TO | IRVN Video Network                                 |
| NYSTA Statewide Operations Center      | TO | IRVN Video Network                                 |
| NYSTA Statewide Operations Center      | TO | Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center      | TO | Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center      | TO | Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center      | TO | Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center      | TO | Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center      | TO | NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center      | TO | NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center      | TO | NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center      | TO | NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center      | TO | NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center      | TO | NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center      | TO | NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center      | TO | NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center      | TO | NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center      | TO | NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center      | TO | NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center      | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center      | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center      | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center      | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Maintenance and Construction                 |
| TRANSCOM Operations Information Center | TO | IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO | IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO | IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO | IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO | IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO | IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO | IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO | IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO | IRVN Video Network                                 |



|  |    |  |
|--|----|--|
| TRANSCOM Operations Information Center | TO | IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO | Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO | Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO | Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO | Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO | Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System        | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System        | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System        | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System        | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System        | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System        | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System        | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System        | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System        | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System        | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System        | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System        | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System        | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System        | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System        | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System        | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System        | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System        | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System        | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System        | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System        | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System        | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System        | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System        | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System        | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System        | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System        | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System        | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System        | TO | NYSDOT Maintenance and Construction                |
| HVTMC Freeway Management System        | TO | NYSDOT Maintenance and Construction                |
| HVTMC Freeway Management System        | TO | NYSDOT Maintenance and Construction                |
| HVTMC Freeway Management System        | TO | NYSDOT Maintenance and Construction                |

|                                 |    |  |
|---------------------------------|----|--|
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |
| HVTMC Freeway Management System | TO | PART Bus System                                    |
| HVTMC Freeway Management System | TO | PART Bus System                                    |
| HVTMC Freeway Management System | TO | PART Bus System                                    |
| HVTMC Freeway Management System | TO | PART Bus System                                    |
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction                 |



|                                 |    |  |
|---------------------------------|----|--|
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction                |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction                |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction                |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction                |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |

|                                 |    |  |
|---------------------------------|----|--|
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |
| HVTMC Freeway Management System | TO | PART Bus System                                    |
| HVTMC Freeway Management System | TO | PART Bus System                                    |
| HVTMC Freeway Management System | TO | PART Bus System                                    |
| HVTMC Freeway Management System | TO | PART Bus System                                    |
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction                |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction                |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction                |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction                |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |

|                                 |    |  |
|---------------------------------|----|--|
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |
| HVTMC Freeway Management System | TO | PART Bus System                                    |
| HVTMC Freeway Management System | TO | PART Bus System                                    |
| HVTMC Freeway Management System | TO | PART Bus System                                    |
| HVTMC Freeway Management System | TO | PART Bus System                                    |
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | Rockland TOR                                       |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System            |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | HVTMC ITS Information Service Provider             |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IEN Information Exchange Network                   |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | IRVN Video Network                                 |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System | TO | Local Maintenance and Construction                 |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System | TO | Media Traffic and Travel Information System        |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center          |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction                |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction                |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction                |
| HVTMC Freeway Management System | TO | NYSDOT Maintenance and Construction                |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |
| HVTMC Freeway Management System | TO | NYSP Central Communication/Dispatch                |

|                                 |   |
|---------------------------------|---|
| HVTMC Freeway Management System | TO PART Bus System                                    |
| HVTMC Freeway Management System | TO PART Bus System                                    |
| HVTMC Freeway Management System | TO PART Bus System                                    |
| HVTMC Freeway Management System | TO PART Bus System                                    |
| HVTMC Freeway Management System | TO Rockland TOR                                       |
| HVTMC Freeway Management System | TO Rockland TOR                                       |
| HVTMC Freeway Management System | TO Rockland TOR                                       |
| HVTMC Freeway Management System | TO Rockland TOR                                       |
| HVTMC Freeway Management System | TO SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO SATIN (Service Area Travelers Interactive Network) |
| HVTMC Freeway Management System | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center         | TO IRVN Video Network                                 |
| NYSBA Operations Center         | TO IRVN Video Network                                 |
| NYSBA Operations Center         | TO IRVN Video Network                                 |
| NYSBA Operations Center         | TO IRVN Video Network                                 |
| NYSBA Operations Center         | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center         | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center         | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center         | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center         | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center         | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center         | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center         | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center         | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center         | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center         | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center         | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center         | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center         | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center         | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center         | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center         | TO IRVN Video Network                                 |
| NYSBA Operations Center         | TO IRVN Video Network                                 |
| NYSBA Operations Center         | TO IRVN Video Network                                 |
| NYSBA Operations Center         | TO IRVN Video Network                                 |
| NYSBA Operations Center         | TO IRVN Video Network                                 |
| NYSBA Operations Center         | TO IRVN Video Network                                 |
| NYSBA Operations Center         | TO IRVN Video Network                                 |
| NYSBA Operations Center         | TO IRVN Video Network                                 |
| NYSBA Operations Center         | TO IRVN Video Network                                 |
| NYSBA Operations Center         | TO IRVN Video Network                                 |
| NYSBA Operations Center         | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center         | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center         | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center         | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center         | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center         | TO Media Traffic and Travel Information System        |

|                         |    |  |
|-------------------------|----|--|
| NYSBA Operations Center | TO | Media Traffic and Travel Information System        |
| NYSBA Operations Center | TO | Media Traffic and Travel Information System        |
| NYSBA Operations Center | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center | TO | NYSBA Maintenance and Construction                 |
| NYSBA Operations Center | TO | NYSBA Maintenance and Construction                 |
| NYSBA Operations Center | TO | NYSBA Maintenance and Construction                 |
| NYSBA Operations Center | TO | NYSBA Maintenance and Construction                 |
| NYSBA Operations Center | TO | NYSBA Maintenance and Construction                 |
| NYSBA Operations Center | TO | NYSBA Maintenance and Construction                 |
| NYSBA Operations Center | TO | NYSBA Maintenance and Construction                 |
| NYSBA Operations Center | TO | NYSBA Maintenance and Construction                 |
| NYSBA Operations Center | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center | TO | IRVN Video Network                                 |
| NYSBA Operations Center | TO | IRVN Video Network                                 |
| NYSBA Operations Center | TO | IRVN Video Network                                 |
| NYSBA Operations Center | TO | IRVN Video Network                                 |
| NYSBA Operations Center | TO | Media Traffic and Travel Information System        |
| NYSBA Operations Center | TO | Media Traffic and Travel Information System        |
| NYSBA Operations Center | TO | Media Traffic and Travel Information System        |
| NYSBA Operations Center | TO | Media Traffic and Travel Information System        |
| NYSBA Operations Center | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center | TO | NYSBA ITS Information Service Provider             |
| NYSBA Operations Center | TO | NYSBA Maintenance and Construction                 |
| NYSBA Operations Center | TO | NYSBA Maintenance and Construction                 |
| NYSBA Operations Center | TO | NYSBA Maintenance and Construction                 |
| NYSBA Operations Center | TO | NYSBA Maintenance and Construction                 |
| NYSBA Operations Center | TO | SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center | TO | SATIN (Service Area Travelers Interactive Network) |



|                                    |   |
|------------------------------------|---|
| NYSBA Operations Center            | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center            | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center            | TO IRVN Video Network                                 |
| NYSBA Operations Center            | TO IRVN Video Network                                 |
| NYSBA Operations Center            | TO IRVN Video Network                                 |
| NYSBA Operations Center            | TO IRVN Video Network                                 |
| NYSBA Operations Center            | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center            | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center            | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center            | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center            | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center            | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center            | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center            | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center            | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center            | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center            | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center            | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center            | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center            | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center            | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center            | TO IRVN Video Network                                 |
| NYSBA Operations Center            | TO IRVN Video Network                                 |
| NYSBA Operations Center            | TO IRVN Video Network                                 |
| NYSBA Operations Center            | TO IRVN Video Network                                 |
| NYSBA Operations Center            | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center            | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center            | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center            | TO Media Traffic and Travel Information System        |
| NYSBA Operations Center            | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center            | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center            | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center            | TO NYSBA ITS Information Service Provider             |
| NYSBA Operations Center            | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center            | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center            | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center            | TO NYSBA Maintenance and Construction                 |
| NYSBA Operations Center            | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center            | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center            | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Operations Center            | TO SATIN (Service Area Travelers Interactive Network) |
| NYSBA Satellite Operations Centers | TO NYSBA ITS Information Service Provider             |
| NYSBA Satellite Operations Centers | TO NYSBA ITS Information Service Provider             |
| NYSBA Satellite Operations Centers | TO NYSBA ITS Information Service Provider             |



|                                   |   |
|-----------------------------------|---|
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |

|                                   |   |
|-----------------------------------|---|
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |

|                                   |   |
|-----------------------------------|---|
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IEN Information Exchange Network                   |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO IRVN Video Network                                 |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO Media Traffic and Travel Information System        |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA ITS Information Service Provider             |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO NYSTA Maintenance and Construction                 |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |
| NYSTA Statewide Operations Center | TO SATIN (Service Area Travelers Interactive Network) |

|  |   |
|--|---|
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| NYSTA Tarrytown Equipment Hub          | TO NYSTA Maintenance and Construction                 |
| TRANSCOM Operations Information Center | TO IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO IEN Information Exchange Network                   |



|  |    |  |
|--|----|--|
| TRANSCOM Operations Information Center | TO | Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO | IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO | IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO | IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO | IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO | IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO | IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO | IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO | Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO | Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO | Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO | Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO | IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO | IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO | IEN Information Exchange Network                   |
| TRANSCOM Operations Information Center | TO | IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO | IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO | IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO | IRVN Video Network                                 |
| TRANSCOM Operations Information Center | TO | Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO | Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO | Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO | Media Traffic and Travel Information System        |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |
| TRANSCOM Operations Information Center | TO | Other Privatized ISPs                              |



|  |    |  |
|--|----|--|
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Operations Information Center | TO | SATIN (Service Area Travelers Interactive Network) |

### **Standards**

(AASHTO/ITE/NEMA) Message Set for Weather Reports (Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

road network probe information

Emergency Management To Maintenance and Construction Management

### **Inventory**

|   |    |  |
|---|----|--|
| Bee-Line Bus Operations Dispatch System | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider  | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider  | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider  | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider  | TO | NYSDOT Maintenance and Construction    |
| HVTMC ITS Information Service Provider  | TO | NYSDOT Maintenance and Construction    |
| HVTMC ITS Information Service Provider  | TO | NYSDOT Maintenance and Construction    |
| HVTMC ITS Information Service Provider  | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider  | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider  | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider  | TO | NYSDOT Maintenance and Construction    |
| HVTMC ITS Information Service Provider  | TO | NYSDOT Maintenance and Construction    |
| HVTMC ITS Information Service Provider  | TO | NYSDOT Maintenance and Construction    |
| IEN Information Exchange Network        | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network        | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network        | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network        | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network        | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network        | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network        | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network        | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network        | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network        | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network        | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network        | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network        | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network        | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network        | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network        | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network        | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network        | TO | TRANSCOM Operations Information Center |
| NYSBA ITS Information Service Provider  | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider  | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider  | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider  | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider  | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider  | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider  | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider  | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider  | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider  | TO | NYSBA Maintenance and Construction     |

|  |    |  |
|--|----|--|
| NYSBA ITS Information Service Provider             | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSP Central Communication/Dispatch                | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch                | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch                | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch                | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch                | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch                | TO | HVTMC Freeway Management System        |
| NYSTA ITS Information Service Provider             | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider             | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider             | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider             | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider             | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |

|  |    |  |
|--|----|--|
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | NYSDOT Maintenance and Construction    |
| HVTMC ITS Information Service Provider             | TO | NYSDOT Maintenance and Construction    |
| HVTMC ITS Information Service Provider             | TO | NYSDOT Maintenance and Construction    |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | NYSDOT Maintenance and Construction    |
| HVTMC ITS Information Service Provider             | TO | NYSDOT Maintenance and Construction    |
| HVTMC ITS Information Service Provider             | TO | NYSDOT Maintenance and Construction    |

|  |    |  |
|--|----|--|
| IEN Information Exchange Network       | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network       | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network       | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network       | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network       | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network       | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network       | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network       | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network       | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network       | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network       | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network       | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network       | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network       | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network       | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network       | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network       | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network       | TO | TRANSCOM Operations Information Center |
| NYSBA ITS Information Service Provider | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider | TO | NYSBA Satellite Operations Centers     |
| NYSP Central Communication/Dispatch    | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch    | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch    | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch    | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch    | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch    | TO | HVTMC Freeway Management System        |
| NYSTA ITS Information Service Provider | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider | TO | NYSTA Maintenance and Construction     |

|  |    |  |
|--|----|--|
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |

|  |    |  |
|--|----|--|
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| Bee-Line Bus Operations Dispatch System            | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | NYSDOT Maintenance and Construction    |
| HVTMC ITS Information Service Provider             | TO | NYSDOT Maintenance and Construction    |
| HVTMC ITS Information Service Provider             | TO | NYSDOT Maintenance and Construction    |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | HVTMC Freeway Management System        |
| HVTMC ITS Information Service Provider             | TO | NYSDOT Maintenance and Construction    |
| HVTMC ITS Information Service Provider             | TO | NYSDOT Maintenance and Construction    |
| HVTMC ITS Information Service Provider             | TO | NYSDOT Maintenance and Construction    |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | HVTMC Freeway Management System        |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | NYSTA Statewide Operations Center      |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| IEN Information Exchange Network                   | TO | TRANSCOM Operations Information Center |
| NYSBA ITS Information Service Provider             | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |

|  |    |  |
|--|----|--|
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Maintenance and Construction     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Operations Center                |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSBA ITS Information Service Provider             | TO | NYSBA Satellite Operations Centers     |
| NYSP Central Communication/Dispatch                | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch                | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch                | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch                | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch                | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch                | TO | HVTMC Freeway Management System        |
| NYSP Central Communication/Dispatch                | TO | HVTMC Freeway Management System        |
| NYSTA ITS Information Service Provider             | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider             | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider             | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider             | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider             | TO | NYSTA Maintenance and Construction     |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| NYSTA ITS Information Service Provider             | TO | NYSTA Statewide Operations Center      |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| Other Privatized ISPs                              | TO | TRANSCOM Operations Information Center |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| PART Bus System                                    | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| Rockland TOR                                       | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |



|  |    |  |
|--|----|--|
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | HVTMC Freeway Management System        |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSBA Operations Center                |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | NYSTA Statewide Operations Center      |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |
| SATIN (Service Area Travelers Interactive Network) | TO | TRANSCOM Operations Information Center |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)





|                                     |  |
|-------------------------------------|--|
| NYSDOT Maintenance and Construction | TO NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction | TO Weather Network Subscription                            |
| NYSDOT Maintenance and Construction | TO HVTMC Freeway Management System                         |
| NYSDOT Maintenance and Construction | TO HVTMC ITS Information Service Provider                  |
| NYSDOT Maintenance and Construction | TO Media Traffic and Travel Information System             |
| NYSDOT Maintenance and Construction | TO NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction | TO Weather Network Subscription                            |
| NYSDOT Maintenance and Construction | TO HVTMC Freeway Management System                         |
| NYSDOT Maintenance and Construction | TO HVTMC ITS Information Service Provider                  |
| NYSDOT Maintenance and Construction | TO Media Traffic and Travel Information System             |
| NYSDOT Maintenance and Construction | TO NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction | TO Weather Network Subscription                            |
| NYSDOT Maintenance and Construction | TO HVTMC Freeway Management System                         |
| NYSDOT Maintenance and Construction | TO HVTMC ITS Information Service Provider                  |
| NYSDOT Maintenance and Construction | TO Media Traffic and Travel Information System             |
| NYSDOT Maintenance and Construction | TO NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction | TO Weather Network Subscription                            |
| NYSDOT Maintenance and Construction | TO HVTMC Freeway Management System                         |
| NYSDOT Maintenance and Construction | TO HVTMC ITS Information Service Provider                  |
| NYSDOT Maintenance and Construction | TO Media Traffic and Travel Information System             |
| NYSDOT Maintenance and Construction | TO NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction | TO Weather Network Subscription                            |
| NYSDOT Maintenance and Construction | TO Media Traffic and Travel Information System             |
| NYSTA Maintenance and Construction  | TO NYSTA ITS Information Service Provider                  |
| NYSTA Maintenance and Construction  | TO NYSTA Statewide Operations Center                       |
| NYSTA Maintenance and Construction  | TO NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction  | TO NYSTA Tarrytown Equipment Hub                           |
| NYSTA Maintenance and Construction  | TO Weather Network Subscription                            |
| NYSTA Maintenance and Construction  | TO Media Traffic and Travel Information System             |
| NYSTA Maintenance and Construction  | TO NYSTA ITS Information Service Provider                  |
| NYSTA Maintenance and Construction  | TO NYSTA Statewide Operations Center                       |
| NYSTA Maintenance and Construction  | TO NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction  | TO NYSTA Tarrytown Equipment Hub                           |
| NYSTA Maintenance and Construction  | TO Weather Network Subscription                            |
| NYSTA Maintenance and Construction  | TO Media Traffic and Travel Information System             |
| NYSTA Maintenance and Construction  | TO NYSTA ITS Information Service Provider                  |
| NYSTA Maintenance and Construction  | TO NYSTA Statewide Operations Center                       |
| NYSTA Maintenance and Construction  | TO NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction  | TO NYSTA Tarrytown Equipment Hub                           |

|                                     |  |
|-------------------------------------|--|
| NYSTA Maintenance and Construction  | TO Weather Network Subscription                            |
| NYSTA Maintenance and Construction  | TO Media Traffic and Travel Information System             |
| NYSTA Maintenance and Construction  | TO NYSTA ITS Information Service Provider                  |
| NYSTA Maintenance and Construction  | TO NYSTA Statewide Operations Center                       |
| NYSTA Maintenance and Construction  | TO NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction  | TO NYSTA Tarrytown Equipment Hub                           |
| NYSTA Maintenance and Construction  | TO Weather Network Subscription                            |
| NYSTA Maintenance and Construction  | TO Media Traffic and Travel Information System             |
| NYSTA Maintenance and Construction  | TO NYSTA ITS Information Service Provider                  |
| NYSTA Maintenance and Construction  | TO NYSTA Statewide Operations Center                       |
| NYSTA Maintenance and Construction  | TO NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction  | TO NYSTA Tarrytown Equipment Hub                           |
| NYSTA Maintenance and Construction  | TO Weather Network Subscription                            |
| NYSTA Maintenance and Construction  | TO Media Traffic and Travel Information System             |
| NYSTA Maintenance and Construction  | TO NYSTA ITS Information Service Provider                  |
| NYSTA Maintenance and Construction  | TO NYSTA Statewide Operations Center                       |
| NYSTA Maintenance and Construction  | TO NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction  | TO NYSTA Tarrytown Equipment Hub                           |
| NYSTA Maintenance and Construction  | TO Weather Network Subscription                            |
| NYSTA Maintenance and Construction  | TO Media Traffic and Travel Information System             |
| NYSTA Maintenance and Construction  | TO NYSTA ITS Information Service Provider                  |
| NYSTA Maintenance and Construction  | TO NYSTA Statewide Operations Center                       |
| NYSTA Maintenance and Construction  | TO NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Maintenance and Construction  | TO NYSTA Tarrytown Equipment Hub                           |
| NYSTA Maintenance and Construction  | TO Weather Network Subscription                            |
| Local Maintenance and Construction  | TO HVTMC Freeway Management System                         |
| Local Maintenance and Construction  | TO Media Traffic and Travel Information System             |
| Local Maintenance and Construction  | TO Weather Network Subscription                            |
| NYSBA Maintenance and Construction  | TO Media Traffic and Travel Information System             |
| NYSBA Maintenance and Construction  | TO NYSBA ITS Information Service Provider                  |
| NYSBA Maintenance and Construction  | TO NYSBA Operations Center                                 |
| NYSBA Maintenance and Construction  | TO NYSBA Satellite Operations Centers                      |
| NYSBA Maintenance and Construction  | TO Weather Network Subscription                            |
| NYSDOT Maintenance and Construction | TO HVTMC Freeway Management System                         |
| NYSDOT Maintenance and Construction | TO HVTMC ITS Information Service Provider                  |
| NYSDOT Maintenance and Construction | TO Media Traffic and Travel Information System             |
| NYSDOT Maintenance and Construction | TO NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction | TO Weather Network Subscription                            |
| NYSTA Maintenance and Construction  | TO Media Traffic and Travel Information System             |
| NYSTA Maintenance and Construction  | TO NYSTA ITS Information Service Provider                  |
| NYSTA Maintenance and Construction  | TO NYSTA Statewide Operations Center                       |

|                                    |    |  |
|------------------------------------|----|--|
| NYSTA Maintenance and Construction | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction | TO | NYSTA Tarrytown Equipment Hub                          |
| NYSTA Maintenance and Construction | TO | Weather Network Subscription                           |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

roadside archive data

Roadway Subsystem To Archived Data Management Subsystem

**Inventory**

|                                   |    |                                      |
|-----------------------------------|----|--------------------------------------|
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Toll Archive System            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Toll Archive System            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Toll Archive System            |
| NYSDOT RWIS Servers               | TO | HVTMC Traffic Data Archive           |
| NYSDOT RWIS Servers               | TO | HVTMC Traffic Data Archive           |
| NYSDOT RWIS Servers               | TO | HVTMC Traffic Data Archive           |
| NYSDOT RWIS Servers               | TO | NYSDOT Maintenance Management System |
| NYSDOT RWIS Servers               | TO | NYSDOT Maintenance Management System |
| NYSDOT RWIS Servers               | TO | NYSDOT Maintenance Management System |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Traffic Data Archive           |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Traffic Data Archive           |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Traffic Data Archive           |

**Standards**

(AASHTO/ITE/NEMA) Data Collection & Monitoring Devices (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

**Architecture Flow**

roadside transaction status

Toll Collection To Driver

**Inventory**

|  |    |                            |
|--|----|----------------------------|
| NYSBA Toll Collection Equipment            | TO | Driver Operating A Vehicle |
| NYSTA Electronic Toll Collection Equipment | TO | Driver Operating A Vehicle |

**Standards**

None

**Architecture Flow**

roadway equipment coordination

Roadway Subsystem To Other Roadway

**Inventory**

|  |    |  |
|--|----|--|
| Local Sensors and CCTV Equipment       | TO | Sensor to Sensor Communication Devices |
| NYSBA Sensors and CCTV Equipment       | TO | Sensor to Sensor Communication Devices |
| NYSDOT Sensors and CCTV Equipment      | TO | Sensor to Sensor Communication Devices |
| NYSTA DSRC Equipment                   | TO | Sensor to Sensor Communication Devices |
| NYSTA Sensors and CCTV Equipment       | TO | Sensor to Sensor Communication Devices |
| Sensor to Sensor Communication Devices | TO | Local Sensors and CCTV Equipment       |
| Sensor to Sensor Communication Devices | TO | NYSBA Sensors and CCTV Equipment       |
| Sensor to Sensor Communication Devices | TO | NYSDOT Sensors and CCTV Equipment      |
| Sensor to Sensor Communication Devices | TO | NYSTA DSRC Equipment                   |
| Sensor to Sensor Communication Devices | TO | NYSTA Sensors and CCTV Equipment       |
| Sensor to Sensor Communication Devices | TO | TRANSCOM Sensors and CCTV Equipment    |
| TRANSCOM Sensors and CCTV Equipment    | TO | Sensor to Sensor Communication Devices |

**Standards**

None

## Architecture Flow

roadway information system data

Maintenance and Construction Management To Roadway Subsystem

### **Inventory**

|                                    |    |  |
|------------------------------------|----|--|
| HVTMC Freeway Management System    | TO | NYSDOT DMS and HAR Information Broadcast Equipment |
| HVTMC Freeway Management System    | TO | NYSDOT DMS and HAR Information Broadcast Equipment |
| HVTMC Freeway Management System    | TO | NYSDOT DMS and HAR Information Broadcast Equipment |
| NYSBA Operations Center            | TO | NYSBA Sensors and CCTV Equipment                   |
| NYSBA Operations Center            | TO | NYSBA Sensors and CCTV Equipment                   |
| NYSBA Operations Center            | TO | NYSBA Sensors and CCTV Equipment                   |
| NYSTA Maintenance and Construction | TO | NYSTA DMS and HAR Information Broadcast Equipment  |
| NYSTA Maintenance and Construction | TO | NYSTA DMS and HAR Information Broadcast Equipment  |
| NYSTA Maintenance and Construction | TO | NYSTA DMS and HAR Information Broadcast Equipment  |
| NYSTA Maintenance and Construction | TO | NYSTA DSRC Equipment                               |
| NYSTA Maintenance and Construction | TO | NYSTA DSRC Equipment                               |
| NYSTA Maintenance and Construction | TO | NYSTA DSRC Equipment                               |
| HVTMC Freeway Management System    | TO | NYSDOT DMS and HAR Information Broadcast Equipment |
| HVTMC Freeway Management System    | TO | NYSDOT DMS and HAR Information Broadcast Equipment |
| HVTMC Freeway Management System    | TO | NYSDOT DMS and HAR Information Broadcast Equipment |
| NYSBA Operations Center            | TO | NYSBA Sensors and CCTV Equipment                   |
| NYSBA Operations Center            | TO | NYSBA Sensors and CCTV Equipment                   |
| NYSBA Operations Center            | TO | NYSBA Sensors and CCTV Equipment                   |
| NYSTA Maintenance and Construction | TO | NYSTA DMS and HAR Information Broadcast Equipment  |
| NYSTA Maintenance and Construction | TO | NYSTA DMS and HAR Information Broadcast Equipment  |
| NYSTA Maintenance and Construction | TO | NYSTA DMS and HAR Information Broadcast Equipment  |
| NYSTA Maintenance and Construction | TO | NYSTA DSRC Equipment                               |
| NYSTA Maintenance and Construction | TO | NYSTA DSRC Equipment                               |
| NYSTA Maintenance and Construction | TO | NYSTA DSRC Equipment                               |

### **Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Object Definitions for Dynamic Message Signs (Data Dictionary, Message Set )



## Architecture Flow

roadway information system status

### Roadway Subsystem To Maintenance and Construction Management

#### **Inventory**

|  |    |                                     |
|--|----|-------------------------------------|
| NYSBA Sensors and CCTV Equipment                   | TO | NYSBA Maintenance and Construction  |
| NYSBA Sensors and CCTV Equipment                   | TO | NYSBA Maintenance and Construction  |
| NYSBA Sensors and CCTV Equipment                   | TO | NYSBA Maintenance and Construction  |
| NYSBA Sensors and CCTV Equipment                   | TO | NYSBA Operations Center             |
| NYSBA Sensors and CCTV Equipment                   | TO | NYSBA Operations Center             |
| NYSBA Sensors and CCTV Equipment                   | TO | NYSBA Operations Center             |
| NYSBA Sensors and CCTV Equipment                   | TO | NYSBA Maintenance and Construction  |
| NYSBA Sensors and CCTV Equipment                   | TO | NYSBA Maintenance and Construction  |
| NYSBA Sensors and CCTV Equipment                   | TO | NYSBA Maintenance and Construction  |
| NYSBA Sensors and CCTV Equipment                   | TO | NYSBA Operations Center             |
| NYSBA Sensors and CCTV Equipment                   | TO | NYSBA Operations Center             |
| NYSBA Sensors and CCTV Equipment                   | TO | NYSBA Operations Center             |
| NYSDOT DMS and HAR Information Broadcast Equipment | TO | HVTMC Freeway Management System     |
| NYSDOT DMS and HAR Information Broadcast Equipment | TO | HVTMC Freeway Management System     |
| NYSDOT DMS and HAR Information Broadcast Equipment | TO | HVTMC Freeway Management System     |
| NYSDOT DMS and HAR Information Broadcast Equipment | TO | HVTMC Freeway Management System     |
| NYSDOT DMS and HAR Information Broadcast Equipment | TO | HVTMC Freeway Management System     |
| NYSDOT DMS and HAR Information Broadcast Equipment | TO | HVTMC Freeway Management System     |
| NYSDOT DMS and HAR Information Broadcast Equipment | TO | HVTMC Freeway Management System     |
| NYSDOT RWIS Servers                                | TO | NYSDOT Maintenance and Construction |
| NYSDOT RWIS Servers                                | TO | NYSDOT Maintenance and Construction |
| NYSDOT RWIS Servers                                | TO | NYSDOT Maintenance and Construction |
| NYSDOT RWIS Servers                                | TO | NYSDOT Maintenance and Construction |
| NYSDOT RWIS Servers                                | TO | NYSDOT Maintenance and Construction |
| NYSDOT RWIS Servers                                | TO | NYSDOT Maintenance and Construction |
| NYSDOT RWIS Servers                                | TO | NYSDOT Maintenance and Construction |
| NYSTA DMS and HAR Information Broadcast Equipment  | TO | NYSTA Maintenance and Construction  |
| NYSTA DMS and HAR Information Broadcast Equipment  | TO | NYSTA Maintenance and Construction  |
| NYSTA DMS and HAR Information Broadcast Equipment  | TO | NYSTA Maintenance and Construction  |
| NYSTA DMS and HAR Information Broadcast Equipment  | TO | NYSTA Maintenance and Construction  |
| NYSTA DMS and HAR Information Broadcast Equipment  | TO | NYSTA Maintenance and Construction  |
| NYSTA DMS and HAR Information Broadcast Equipment  | TO | NYSTA Maintenance and Construction  |
| NYSTA DMS and HAR Information Broadcast Equipment  | TO | NYSTA Maintenance and Construction  |
| NYSTA DSRC Equipment                               | TO | NYSTA Maintenance and Construction  |
| NYSTA DSRC Equipment                               | TO | NYSTA Maintenance and Construction  |
| NYSTA DSRC Equipment                               | TO | NYSTA Maintenance and Construction  |
| NYSTA DSRC Equipment                               | TO | NYSTA Maintenance and Construction  |
| NYSTA DSRC Equipment                               | TO | NYSTA Maintenance and Construction  |
| NYSTA DSRC Equipment                               | TO | NYSTA Maintenance and Construction  |

## **Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Object Definitions for Dynamic Message Signs (Data Dictionary, Message Set )



|                                     |    |   |
|-------------------------------------|----|---|
| NYSDOT Maintenance and Construction | TO | HVTMC ITS Information Service Provider      |
| NYSDOT Maintenance and Construction | TO | Media Traffic and Travel Information System |
| NYSDOT Maintenance and Construction | TO | HVTMC Freeway Management System             |
| NYSDOT Maintenance and Construction | TO | HVTMC ITS Information Service Provider      |
| NYSDOT Maintenance and Construction | TO | Media Traffic and Travel Information System |
| NYSDOT Maintenance and Construction | TO | HVTMC Freeway Management System             |
| NYSDOT Maintenance and Construction | TO | HVTMC ITS Information Service Provider      |
| NYSDOT Maintenance and Construction | TO | Media Traffic and Travel Information System |
| NYSDOT Maintenance and Construction | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | NYSTA ITS Information Service Provider      |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center           |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub               |
| NYSTA Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | NYSTA ITS Information Service Provider      |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center           |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub               |
| NYSTA Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | NYSTA ITS Information Service Provider      |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center           |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub               |
| NYSTA Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | NYSTA ITS Information Service Provider      |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center           |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub               |
| NYSTA Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | NYSTA ITS Information Service Provider      |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center           |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub               |
| NYSTA Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | NYSTA ITS Information Service Provider      |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center           |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub               |
| Local Maintenance and Construction  | TO | HVTMC Freeway Management System             |
| Local Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSBA Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSBA Maintenance and Construction  | TO | NYSBA ITS Information Service Provider      |
| NYSBA Maintenance and Construction  | TO | NYSBA Operations Center                     |
| NYSBA Maintenance and Construction  | TO | NYSBA Satellite Operations Centers          |
| NYSDOT Maintenance and Construction | TO | HVTMC Freeway Management System             |
| NYSDOT Maintenance and Construction | TO | HVTMC ITS Information Service Provider      |
| NYSDOT Maintenance and Construction | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | NYSTA ITS Information Service Provider      |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center           |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub               |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

route assignment

Transit Management To Transit Driver

**Inventory**

|   |    |                             |
|---|----|-----------------------------|
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Driver         |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Driver    |
| Metro North Rail Operation Control Center | TO | Metro North Train Engineers |
| PART Bus System                           | TO | PART Bus Driver             |
| Rockland TOR                              | TO | Rockland TOR Bus Driver     |

**Standards**

None

**Architecture Flow**

safety status information

Commercial Vehicle Administration To Commercial Vehicle Check

**Inventory**

|  |    |  |
|--|----|--|
| Statewide Commercial Vehicle Information Exchange Window (CVIEW) | TO | Statewide CVO Information Exchange Network |
| Statewide Commercial Vehicle Information Exchange Window (CVIEW) | TO | Statewide CVO Information Exchange Network |
| Statewide Commercial Vehicle Information Exchange Window (CVIEW) | TO | Statewide CVO Information Exchange Network |
| Statewide Commercial Vehicle Information Exchange Window (CVIEW) | TO | Statewide CVO Information Exchange Network |
| Statewide Commercial Vehicle Information Exchange Window (CVIEW) | TO | Statewide CVO Information Exchange Network |

**Standards**

(ANSI) Commercial Vehicle Safety and Credentials Information Exchange (Data Dictionary, Message Set )

**Architecture Flow**

secure area characteristics

Secure Area Environment To Remote Traveler Support

**Inventory**

|                                     |    |                                    |
|-------------------------------------|----|------------------------------------|
| Bee-Line Transit Stops and Stations | TO | Public Security Monitoring Devices |
| Metro North Train Stations          | TO | Public Security Monitoring Devices |

**Standards**

None

## Architecture Flow

selected routes

### Information Service Provider To Transit Management

#### **Inventory**

|  |    |   |
|--|----|---|
| HVTMC ITS Information Service Provider             | TO | Bee-Line Bus Operations Dispatch System |
| HVTMC ITS Information Service Provider             | TO | Bee-Line Bus Operations Dispatch System |
| HVTMC ITS Information Service Provider             | TO | Bee-Line Bus Operations Dispatch System |
| HVTMC ITS Information Service Provider             | TO | Bee-Line Bus Operations Dispatch System |
| HVTMC ITS Information Service Provider             | TO | Bee-Line Bus Operations Dispatch System |
| HVTMC ITS Information Service Provider             | TO | Bee-Line Bus Operations Dispatch System |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | PART Bus System                         |
| HVTMC ITS Information Service Provider             | TO | PART Bus System                         |
| HVTMC ITS Information Service Provider             | TO | PART Bus System                         |
| HVTMC ITS Information Service Provider             | TO | PART Bus System                         |
| HVTMC ITS Information Service Provider             | TO | PART Bus System                         |
| HVTMC ITS Information Service Provider             | TO | PART Bus System                         |
| HVTMC ITS Information Service Provider             | TO | Rockland TOR                            |
| HVTMC ITS Information Service Provider             | TO | Rockland TOR                            |
| HVTMC ITS Information Service Provider             | TO | Rockland TOR                            |
| HVTMC ITS Information Service Provider             | TO | Rockland TOR                            |
| HVTMC ITS Information Service Provider             | TO | Rockland TOR                            |
| HVTMC ITS Information Service Provider             | TO | Rockland TOR                            |
| SATIN (Service Area Travelers Interactive Network) | TO | Bee-Line Bus Operations Dispatch System |
| SATIN (Service Area Travelers Interactive Network) | TO | Bee-Line Bus Operations Dispatch System |
| SATIN (Service Area Travelers Interactive Network) | TO | Bee-Line Bus Operations Dispatch System |
| SATIN (Service Area Travelers Interactive Network) | TO | Bee-Line Bus Operations Dispatch System |
| SATIN (Service Area Travelers Interactive Network) | TO | Bee-Line Bus Operations Dispatch System |
| SATIN (Service Area Travelers Interactive Network) | TO | Bee-Line Bus Operations Dispatch System |
| SATIN (Service Area Travelers Interactive Network) | TO | City / Local Transit Operations         |
| SATIN (Service Area Travelers Interactive Network) | TO | City / Local Transit Operations         |
| SATIN (Service Area Travelers Interactive Network) | TO | City / Local Transit Operations         |
| SATIN (Service Area Travelers Interactive Network) | TO | City / Local Transit Operations         |
| SATIN (Service Area Travelers Interactive Network) | TO | City / Local Transit Operations         |
| SATIN (Service Area Travelers Interactive Network) | TO | City / Local Transit Operations         |

## Standards

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

signal control data

### Traffic Management To Roadway Subsystem

#### **Inventory**

|  |    |                                     |
|--|----|-------------------------------------|
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| Westchester County Signal System       | TO | Local Sensors and CCTV Equipment    |
| Westchester County Signal System       | TO | Local Sensors and CCTV Equipment    |
| Westchester County Signal System       | TO | Local Sensors and CCTV Equipment    |
| Westchester County Signal System       | TO | Local Sensors and CCTV Equipment    |
| Westchester County Signal System       | TO | Local Sensors and CCTV Equipment    |
| White Plains Traffic Signal System     | TO | Local Sensors and CCTV Equipment    |
| White Plains Traffic Signal System     | TO | Local Sensors and CCTV Equipment    |
| White Plains Traffic Signal System     | TO | Local Sensors and CCTV Equipment    |
| White Plains Traffic Signal System     | TO | Local Sensors and CCTV Equipment    |
| White Plains Traffic Signal System     | TO | Local Sensors and CCTV Equipment    |



## **Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Object Definitions for Actuated Traffic Signal Controller Units (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) Objects for Signal Control Priority (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) Objects for Signal Systems Master (Data Dictionary, Message Set )

## Architecture Flow

signal control status

### Roadway Subsystem To Traffic Management

#### **Inventory**

|                                     |    |  |
|-------------------------------------|----|--|
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System       |
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System       |
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System       |
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System       |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System     |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System     |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System     |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |

#### **Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Object Definitions for Actuated Traffic Signal Controller Units (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) Objects for Signal Systems Master (Data Dictionary, Message Set )

## Architecture Flow

speed monitoring control

Maintenance and Construction Management To Roadway Subsystem

### **Inventory**

|  |    |                                     |
|--|----|-------------------------------------|
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| NYSBA Maintenance and Construction     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Maintenance and Construction     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Maintenance and Construction     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSP                                   | TO | Portable Speed Monitoring Stations  |
| NYSP                                   | TO | Portable Speed Monitoring Stations  |
| NYSP                                   | TO | Portable Speed Monitoring Stations  |
| NYSTA Maintenance and Construction     | TO | NYSTA DSRC Equipment                |
| NYSTA Maintenance and Construction     | TO | NYSTA DSRC Equipment                |
| NYSTA Maintenance and Construction     | TO | NYSTA DSRC Equipment                |
| NYSTA Maintenance and Construction     | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Maintenance and Construction     | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Maintenance and Construction     | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| NYSBA Maintenance and Construction     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Maintenance and Construction     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Maintenance and Construction     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSP                                   | TO | Portable Speed Monitoring Stations  |
| NYSP                                   | TO | Portable Speed Monitoring Stations  |
| NYSP                                   | TO | Portable Speed Monitoring Stations  |
| NYSTA Maintenance and Construction     | TO | NYSTA DSRC Equipment                |

|  |    |                                     |
|--|----|-------------------------------------|
| NYSTA Maintenance and Construction     | TO | NYSTA DSRC Equipment                |
| NYSTA Maintenance and Construction     | TO | NYSTA DSRC Equipment                |
| NYSTA Maintenance and Construction     | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Maintenance and Construction     | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Maintenance and Construction     | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |

**Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Transportation System Sensor Objects (Data Dictionary, Message Set )

**Architecture Flow**

speed monitoring information

Roadway Subsystem To Maintenance and Construction Management

**Inventory**

|                                   |    |                                    |
|-----------------------------------|----|------------------------------------|
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Maintenance and Construction |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Maintenance and Construction |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Maintenance and Construction |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Operations Center            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Operations Center            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Operations Center            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Satellite Operations Centers |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Satellite Operations Centers |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Satellite Operations Centers |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Maintenance and Construction |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Maintenance and Construction |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Maintenance and Construction |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Operations Center            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Operations Center            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Operations Center            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Satellite Operations Centers |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Satellite Operations Centers |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Satellite Operations Centers |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System    |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System    |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System    |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System    |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System    |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System    |
| NYSTA DSRC Equipment              | TO | NYSTA Maintenance and Construction |
| NYSTA DSRC Equipment              | TO | NYSTA Maintenance and Construction |
| NYSTA DSRC Equipment              | TO | NYSTA Maintenance and Construction |
| NYSTA DSRC Equipment              | TO | NYSTA Maintenance and Construction |
| NYSTA DSRC Equipment              | TO | NYSTA Maintenance and Construction |
| NYSTA DSRC Equipment              | TO | NYSTA Maintenance and Construction |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Maintenance and Construction |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Maintenance and Construction |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Maintenance and Construction |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Statewide Operations Center  |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Statewide Operations Center  |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Statewide Operations Center  |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Tarrytown Equipment Hub      |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Tarrytown Equipment Hub      |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Tarrytown Equipment Hub      |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Maintenance and Construction |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Maintenance and Construction |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Maintenance and Construction |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Statewide Operations Center  |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Statewide Operations Center  |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Statewide Operations Center  |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Tarrytown Equipment Hub      |

|                                     |    |  |
|-------------------------------------|----|--|
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| Portable Speed Monitoring Stations  | TO | NYSP                                   |
| Portable Speed Monitoring Stations  | TO | NYSP                                   |
| Portable Speed Monitoring Stations  | TO | NYSP                                   |
| Portable Speed Monitoring Stations  | TO | NYSP                                   |
| Portable Speed Monitoring Stations  | TO | NYSP                                   |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |

**Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Transportation System Sensor Objects (Data Dictionary, Message Set )

**Architecture Flow**

storage facility request

Maintenance and Construction Management To Storage Facility

**Inventory**

|                                     |    |                                |
|-------------------------------------|----|--------------------------------|
| Local Maintenance and Construction  | TO | Local Maint. Storage Facility  |
| NYSBA Maintenance and Construction  | TO | NYSBA Maint. Storage Facility  |
| NYSDOT Maintenance and Construction | TO | NYSDOT Maint. Storage Facility |
| NYSTA Maintenance and Construction  | TO | NYSTA Maint. Storage Facility  |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

suggested route

Emergency Management To Emergency Vehicle Subsystem

**Inventory**

|                                     |    |  |
|-------------------------------------|----|--|
| Local Emergency Dispatch            | TO | Local Emergency Vehicles (Fire, EMS, Police) |
| NYSP Central Communication/Dispatch | TO | NYSDOT HELP Trucks                           |
| NYSP Central Communication/Dispatch | TO | NYSP Vehicles                                |

**Standards**

None

## **Architecture Flow**

tag data

### Commercial Vehicle Subsystem To Commercial Vehicle Check

#### **Inventory**

|                          |    |  |
|--------------------------|----|--|
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSBA Toll Tag Interface | TO | NYSBA Toll Collection Equipment            |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |
| NYSTA Toll Tag Interface | TO | NYSTA Electronic Toll Collection Equipment |

#### **Standards**

(ASTM) Specification for Dedicated Short Range Communication (DSRC) Data Link Layer: Medium Access and Logical Link Control (Communications Protocol)

(ASTM) Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz (Communications Protocol)

(ASTM) Standard Specification for 5.9 GHz Data Link Layer (Communications Protocol)

(ASTM) Standard Specification for 5.9 GHz Physical Layer (Communications Protocol)

(IEEE) Security/Privacy of Vehicle/RS Communications including Smart Card Communications ()

(IEEE) Standard for Message Sets for Vehicle/Roadside Communications (Data Dictionary, Message Set )

## Architecture Flow

tag update

Parking Management To Vehicle

### **Inventory**

|  |    |                          |
|--|----|--------------------------|
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface |
| NYSBA Toll Collection Equipment            | TO | NYSBA Toll Tag Interface |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface |
| NYSTA Electronic Toll Collection Equipment | TO | NYSTA Toll Tag Interface |

### **Standards**

(ASTM) Specification for Dedicated Short Range Communication (DSRC) Data Link Layer: Medium Access and Logical Link Control (Communications Protocol)

(ASTM) Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz (Communications Protocol)

(ASTM) Standard Specification for 5.9 GHz Data Link Layer (Communications Protocol)

(ASTM) Standard Specification for 5.9 GHz Physical Layer (Communications Protocol)

(IEEE) Security/Privacy of Vehicle/RS Communications including Smart Card Communications ( )

(IEEE) Standard for Message Sets for Vehicle/Roadside Communications (Data Dictionary, Message Set )



**Architecture Flow**

toll administration requests

Toll Administrator To Toll Administration

**Inventory**

|                       |    |                       |
|-----------------------|----|-----------------------|
| NYSBA Toll Controller | TO | NYSBA Toll Operations |
| NYSTA Toll Controller | TO | NYSTA Toll Operations |

**Standards**

None

**Architecture Flow**

toll archive data

Toll Administration To Archived Data Management Subsystem

**Inventory**

|                       |    |                                |
|-----------------------|----|--------------------------------|
| NYSBA Toll Operations | TO | NYSBA Toll Archive System      |
| NYSBA Toll Operations | TO | NYSBA Toll Archive System      |
| NYSBA Toll Operations | TO | NYSBA Toll Archive System      |
| NYSTA Toll Operations | TO | NYSTA Toll Data Storage System |
| NYSTA Toll Operations | TO | NYSTA Toll Data Storage System |
| NYSTA Toll Operations | TO | NYSTA Toll Data Storage System |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

**Architecture Flow**

toll data

Information Service Provider To Fleet and Freight Management

**Inventory**

|                       |    |  |
|-----------------------|----|--|
| NYSBA Toll Operations | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Operations | TO | NYSBA ITS Information Service Provider |
| NYSBA Toll Operations | TO | NYSBA ITS Information Service Provider |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

toll data request

Fleet and Freight Management To Information Service Provider

**Inventory**

|  |    |                       |
|--|----|-----------------------|
| NYSBA ITS Information Service Provider | TO | NYSBA Toll Operations |
| NYSBA ITS Information Service Provider | TO | NYSBA Toll Operations |
| NYSBA ITS Information Service Provider | TO | NYSBA Toll Operations |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

toll demand management request

Traffic Management To Toll Administration

**Inventory**

|                                    |    |                       |
|------------------------------------|----|-----------------------|
| NYSBA Operations Center            | TO | NYSBA Toll Operations |
| NYSBA Operations Center            | TO | NYSBA Toll Operations |
| NYSBA Operations Center            | TO | NYSBA Toll Operations |
| NYSBA Satellite Operations Centers | TO | NYSBA Toll Operations |
| NYSBA Satellite Operations Centers | TO | NYSBA Toll Operations |
| NYSBA Satellite Operations Centers | TO | NYSBA Toll Operations |
| NYSTA Statewide Operations Center  | TO | NYSTA Toll Operations |
| NYSTA Statewide Operations Center  | TO | NYSTA Toll Operations |
| NYSTA Statewide Operations Center  | TO | NYSTA Toll Operations |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

**Architecture Flow**

toll demand management response

Toll Administration To Traffic Management

**Inventory**

|                       |    |                                    |
|-----------------------|----|------------------------------------|
| NYSBA Toll Operations | TO | NYSBA Operations Center            |
| NYSBA Toll Operations | TO | NYSBA Operations Center            |
| NYSBA Toll Operations | TO | NYSBA Operations Center            |
| NYSBA Toll Operations | TO | NYSBA Satellite Operations Centers |
| NYSBA Toll Operations | TO | NYSBA Satellite Operations Centers |
| NYSBA Toll Operations | TO | NYSBA Satellite Operations Centers |
| NYSTA Toll Operations | TO | NYSTA Statewide Operations Center  |
| NYSTA Toll Operations | TO | NYSTA Statewide Operations Center  |
| NYSTA Toll Operations | TO | NYSTA Statewide Operations Center  |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

**Architecture Flow**

toll instructions

Toll Administration To Toll Collection

**Inventory**

|                       |    |  |
|-----------------------|----|--|
| NYSBA Toll Operations | TO | NYSBA Toll Collection Equipment            |
| NYSTA Toll Operations | TO | NYSTA Electronic Toll Collection Equipment |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

toll operator requests

Toll Operator To Toll Collection

**Inventory**

|  |    |  |
|--|----|--|
| Bridge Authority Toll Collector / Supervisor | TO | NYSBA Toll Collection Equipment            |
| NYSTA Toll Collector / Supervisor            | TO | NYSTA Electronic Toll Collection Equipment |

**Standards**

None

**Architecture Flow**

toll revenues and summary reports

Toll Administration To Toll Administrator

**Inventory**

NYSBA Toll Operations TO NYSBA Toll Controller

NYSTA Toll Operations TO NYSTA Toll Controller

**Standards**

None

**Architecture Flow**

toll transaction reports

Toll Collection To Toll Operator

**Inventory**

NYSBA Toll Collection Equipment TO Bridge Authority Toll Collector / Supervisor

NYSTA Electronic Toll Collection Equipment TO NYSTA Toll Collector / Supervisor

**Standards**

None

**Architecture Flow**

toll transactions

Toll Collection To Toll Administration

**Inventory**

NYSBA Toll Collection Equipment TO NYSBA Toll Operations

NYSTA Electronic Toll Collection Equipment TO NYSTA Toll Operations

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

track status

Wayside Equipment To Roadway Subsystem

**Inventory**

Railroad Grade Crossing Activation Equipment TO Local Sensors and CCTV Equipment

Railroad Grade Crossing Activation Equipment TO NYSDOT Sensors and CCTV Equipment

Railroad Grade Crossing Activation Equipment TO TRANSCOM Sensors and CCTV Equipment

**Standards**

(IEEE) Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection  
(Data Dictionary, Message Set )

## Architecture Flow

traffic archive data

### Traffic Management To Archived Data Management Subsystem

#### **Inventory**

|                                    |    |  |
|------------------------------------|----|--|
| HVTMC Freeway Management System    | TO | HVTMC Incident Data Archive                          |
| HVTMC Freeway Management System    | TO | HVTMC Incident Data Archive                          |
| HVTMC Freeway Management System    | TO | HVTMC Incident Data Archive                          |
| HVTMC Freeway Management System    | TO | HVTMC Incident Data Archive                          |
| HVTMC Freeway Management System    | TO | HVTMC Traffic Data Archive                           |
| HVTMC Freeway Management System    | TO | HVTMC Traffic Data Archive                           |
| HVTMC Freeway Management System    | TO | HVTMC Traffic Data Archive                           |
| HVTMC Freeway Management System    | TO | HVTMC Traffic Data Archive                           |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance Management System                 |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance Management System                 |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance Management System                 |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance Management System                 |
| NYSBA Operations Center            | TO | NYSBA Toll Archive System                            |
| NYSBA Operations Center            | TO | NYSBA Toll Archive System                            |
| NYSBA Operations Center            | TO | NYSBA Toll Archive System                            |
| NYSBA Operations Center            | TO | NYSBA Toll Archive System                            |
| NYSBA Satellite Operations Centers | TO | NYSBA Toll Archive System                            |
| NYSBA Satellite Operations Centers | TO | NYSBA Toll Archive System                            |
| NYSBA Satellite Operations Centers | TO | NYSBA Toll Archive System                            |
| NYSBA Satellite Operations Centers | TO | NYSBA Toll Archive System                            |
| NYSTA Statewide Operations Center  | TO | NYSTA Infrastructure Inventory and Inspection System |
| NYSTA Statewide Operations Center  | TO | NYSTA Infrastructure Inventory and Inspection System |
| NYSTA Statewide Operations Center  | TO | NYSTA Infrastructure Inventory and Inspection System |
| NYSTA Statewide Operations Center  | TO | NYSTA Infrastructure Inventory and Inspection System |
| NYSTA Statewide Operations Center  | TO | NYSTA Toll Data Storage System                       |
| NYSTA Statewide Operations Center  | TO | NYSTA Toll Data Storage System                       |
| NYSTA Statewide Operations Center  | TO | NYSTA Toll Data Storage System                       |
| NYSTA Statewide Operations Center  | TO | NYSTA Toll Data Storage System                       |
| NYSTA Statewide Operations Center  | TO | NYSTA Traffic Data Storage and Retrieval System      |
| NYSTA Statewide Operations Center  | TO | NYSTA Traffic Data Storage and Retrieval System      |
| NYSTA Statewide Operations Center  | TO | NYSTA Traffic Data Storage and Retrieval System      |
| NYSTA Statewide Operations Center  | TO | NYSTA Traffic Data Storage and Retrieval System      |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Infrastructure Inventory and Inspection System |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Infrastructure Inventory and Inspection System |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Infrastructure Inventory and Inspection System |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Infrastructure Inventory and Inspection System |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Traffic Data Storage and Retrieval System      |

|                                    |    |   |
|------------------------------------|----|---|
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Traffic Data Storage and Retrieval System |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Traffic Data Storage and Retrieval System |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Traffic Data Storage and Retrieval System |
| Westchester County Signal System   | TO | HVTMC Traffic Data Archive                      |
| Westchester County Signal System   | TO | HVTMC Traffic Data Archive                      |
| Westchester County Signal System   | TO | HVTMC Traffic Data Archive                      |
| Westchester County Signal System   | TO | HVTMC Traffic Data Archive                      |
| White Plains Traffic Signal System | TO | HVTMC Traffic Data Archive                      |
| White Plains Traffic Signal System | TO | HVTMC Traffic Data Archive                      |
| White Plains Traffic Signal System | TO | HVTMC Traffic Data Archive                      |
| White Plains Traffic Signal System | TO | HVTMC Traffic Data Archive                      |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(ASTM) ADMS Data Dictionary Specifications (Data Dictionary)

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

**Architecture Flow**

traffic characteristics

Traffic To Roadway Subsystem

**Inventory**

|                      |    |                                     |
|----------------------|----|-------------------------------------|
| Vehicles on the Road | TO | Local Sensors and CCTV Equipment    |
| Vehicles on the Road | TO | NYSBA Sensors and CCTV Equipment    |
| Vehicles on the Road | TO | NYSDOT Sensors and CCTV Equipment   |
| Vehicles on the Road | TO | NYSTA DSRC Equipment                |
| Vehicles on the Road | TO | NYSTA Sensors and CCTV Equipment    |
| Vehicles on the Road | TO | TRANSCOM Sensors and CCTV Equipment |

**Standards**

None

## Architecture Flow

traffic control coordination

Other TM To Traffic Management

### **Inventory**

|                                    |    |  |
|------------------------------------|----|--|
| HVTMC Freeway Management System    | TO | NYSBA Operations Center  |
| HVTMC Freeway Management System    | TO | NYSBA Operations Center  |
| HVTMC Freeway Management System    | TO | NYSBA Operations Center  |
| HVTMC Freeway Management System    | TO | NYSBA Operations Center  |
| HVTMC Freeway Management System    | TO | NYSTA Statewide Operations Center  |
| HVTMC Freeway Management System    | TO | NYSTA Statewide Operations Center  |
| HVTMC Freeway Management System    | TO | NYSTA Statewide Operations Center  |
| HVTMC Freeway Management System    | TO | NYSTA Statewide Operations Center  |
| HVTMC Freeway Management System    | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| HVTMC Freeway Management System    | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| HVTMC Freeway Management System    | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| HVTMC Freeway Management System    | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| HVTMC Freeway Management System    | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| HVTMC Freeway Management System    | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| HVTMC Freeway Management System    | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| HVTMC Freeway Management System    | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Operations Center            | TO | HVTMC Freeway Management System  |
| NYSBA Operations Center            | TO | HVTMC Freeway Management System  |
| NYSBA Operations Center            | TO | HVTMC Freeway Management System  |
| NYSBA Operations Center            | TO | HVTMC Freeway Management System  |
| NYSBA Operations Center            | TO | NYSBA Satellite Operations Centers   |
| NYSBA Operations Center            | TO | NYSBA Satellite Operations Centers   |
| NYSBA Operations Center            | TO | NYSBA Satellite Operations Centers   |
| NYSBA Operations Center            | TO | NYSBA Satellite Operations Centers   |
| NYSBA Operations Center            | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSBA Operations Center            | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSBA Operations Center            | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSBA Operations Center            | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSBA Operations Center            | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Operations Center            | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Operations Center            | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Operations Center            | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Satellite Operations Centers | TO | NYSBA Operations Center  |
| NYSBA Satellite Operations Centers | TO | NYSBA Operations Center  |
| NYSBA Satellite Operations Centers | TO | NYSBA Operations Center  |

|  |    |  |
|--|----|--|
| NYSBA Satellite Operations Centers   | TO | NYSBA Operations Center  |
| NYSTA Statewide Operations Center  | TO | HVTMC Freeway Management System  |
| NYSTA Statewide Operations Center  | TO | HVTMC Freeway Management System  |
| NYSTA Statewide Operations Center  | TO | HVTMC Freeway Management System  |
| NYSTA Statewide Operations Center  | TO | HVTMC Freeway Management System  |
| NYSTA Statewide Operations Center  | TO | NYSTA Tarrytown Equipment Hub  |
| NYSTA Statewide Operations Center  | TO | NYSTA Tarrytown Equipment Hub  |
| NYSTA Statewide Operations Center  | TO | NYSTA Tarrytown Equipment Hub  |
| NYSTA Statewide Operations Center  | TO | NYSTA Tarrytown Equipment Hub  |
| NYSTA Statewide Operations Center  | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSTA Statewide Operations Center  | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSTA Statewide Operations Center  | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSTA Statewide Operations Center  | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSTA Statewide Operations Center  | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSTA Statewide Operations Center  | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSTA Statewide Operations Center  | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSTA Statewide Operations Center  | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSTA Tarrytown Equipment Hub  | TO | NYSTA Statewide Operations Center  |
| NYSTA Tarrytown Equipment Hub  | TO | NYSTA Statewide Operations Center  |
| NYSTA Tarrytown Equipment Hub  | TO | NYSTA Statewide Operations Center  |
| NYSTA Tarrytown Equipment Hub  | TO | NYSTA Statewide Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | HVTMC Freeway Management System  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | HVTMC Freeway Management System  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | HVTMC Freeway Management System  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | HVTMC Freeway Management System  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSBA Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSBA Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSBA Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSBA Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSTA Statewide Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSTA Statewide Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSTA Statewide Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSTA Statewide Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSTA Statewide Operations Center  |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | HVTMC Freeway Management System  |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | HVTMC Freeway Management System  |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | HVTMC Freeway Management System  |



|  |    |  |
|--|----|--|
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA) | TO | HVTMC Freeway Management System  |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA) | TO | NYSBA Operations Center  |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA) | TO | NYSBA Operations Center  |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA) | TO | NYSBA Operations Center  |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA) | TO | NYSBA Operations Center  |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA) | TO | NYSTA Statewide Operations Center  |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA) | TO | NYSTA Statewide Operations Center  |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA) | TO | NYSTA Statewide Operations Center  |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA) | TO | NYSTA Statewide Operations Center  |
| HVTMC Freeway Management System                              | TO | NYSBA Operations Center  |
| HVTMC Freeway Management System                              | TO | NYSBA Operations Center  |
| HVTMC Freeway Management System                              | TO | NYSBA Operations Center  |
| HVTMC Freeway Management System                              | TO | NYSBA Operations Center  |
| HVTMC Freeway Management System                              | TO | NYSTA Statewide Operations Center  |
| HVTMC Freeway Management System                              | TO | NYSTA Statewide Operations Center  |
| HVTMC Freeway Management System                              | TO | NYSTA Statewide Operations Center  |
| HVTMC Freeway Management System                              | TO | NYSTA Statewide Operations Center  |
| HVTMC Freeway Management System                              | TO | NYSTA Statewide Operations Center  |
| HVTMC Freeway Management System                              | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| HVTMC Freeway Management System                              | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| HVTMC Freeway Management System                              | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| HVTMC Freeway Management System                              | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| HVTMC Freeway Management System                              | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| HVTMC Freeway Management System                              | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| HVTMC Freeway Management System                              | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| HVTMC Freeway Management System                              | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Operations Center                                      | TO | HVTMC Freeway Management System  |
| NYSBA Operations Center                                      | TO | HVTMC Freeway Management System  |
| NYSBA Operations Center                                      | TO | HVTMC Freeway Management System  |
| NYSBA Operations Center                                      | TO | HVTMC Freeway Management System  |
| NYSBA Operations Center                                      | TO | NYSBA Satellite Operations Centers   |
| NYSBA Operations Center                                      | TO | NYSBA Satellite Operations Centers   |
| NYSBA Operations Center                                      | TO | NYSBA Satellite Operations Centers   |
| NYSBA Operations Center                                      | TO | NYSBA Satellite Operations Centers   |
| NYSBA Operations Center                                      | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSBA Operations Center                                      | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSBA Operations Center                                      | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSBA Operations Center                                      | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |

|  |   |
|--|---|
| NYSBA Operations Center  | TO Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Operations Center  | TO Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Operations Center  | TO Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Operations Center  | TO Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Satellite Operations Centers   | TO NYSBA Operations Center  |
| NYSBA Satellite Operations Centers   | TO NYSBA Operations Center  |
| NYSBA Satellite Operations Centers   | TO NYSBA Operations Center  |
| NYSBA Satellite Operations Centers   | TO NYSBA Operations Center  |
| NYSTA Statewide Operations Center  | TO HVTMC Freeway Management System  |
| NYSTA Statewide Operations Center  | TO HVTMC Freeway Management System  |
| NYSTA Statewide Operations Center  | TO HVTMC Freeway Management System  |
| NYSTA Statewide Operations Center  | TO HVTMC Freeway Management System  |
| NYSTA Statewide Operations Center  | TO NYSTA Tarrytown Equipment Hub  |
| NYSTA Statewide Operations Center  | TO NYSTA Tarrytown Equipment Hub  |
| NYSTA Statewide Operations Center  | TO NYSTA Tarrytown Equipment Hub  |
| NYSTA Statewide Operations Center  | TO NYSTA Tarrytown Equipment Hub  |
| NYSTA Statewide Operations Center  | TO NYSTA Tarrytown Equipment Hub  |
| NYSTA Statewide Operations Center  | TO Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSTA Statewide Operations Center  | TO Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSTA Statewide Operations Center  | TO Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSTA Statewide Operations Center  | TO Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSTA Statewide Operations Center  | TO Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSTA Statewide Operations Center  | TO Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSTA Statewide Operations Center  | TO Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSTA Statewide Operations Center  | TO Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSTA Tarrytown Equipment Hub  | TO NYSTA Statewide Operations Center  |
| NYSTA Tarrytown Equipment Hub  | TO NYSTA Statewide Operations Center  |
| NYSTA Tarrytown Equipment Hub  | TO NYSTA Statewide Operations Center  |
| NYSTA Tarrytown Equipment Hub  | TO NYSTA Statewide Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO HVTMC Freeway Management System  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO HVTMC Freeway Management System  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO HVTMC Freeway Management System  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO HVTMC Freeway Management System  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO NYSBA Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO NYSBA Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO NYSBA Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO NYSBA Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO NYSTA Statewide Operations Center  |

|  |    |                                   |
|--|----|-----------------------------------|
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSTA Statewide Operations Center |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSTA Statewide Operations Center |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSTA Statewide Operations Center |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | HVTMC Freeway Management System   |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | HVTMC Freeway Management System   |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | HVTMC Freeway Management System   |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | HVTMC Freeway Management System   |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | NYSBA Operations Center           |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | NYSBA Operations Center           |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | NYSBA Operations Center           |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | NYSBA Operations Center           |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | NYSTA Statewide Operations Center |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | NYSTA Statewide Operations Center |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | NYSTA Statewide Operations Center |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | NYSTA Statewide Operations Center |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Objects for Signal Systems Master (Data Dictionary, Message Set )

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

## Architecture Flow

traffic control priority request

Transit Management To Traffic Management

### **Inventory**

|   |    |                                 |
|---|----|---------------------------------|
| Bee-Line Bus Operations Dispatch System   | TO | HVTMC Freeway Management System |
| Bee-Line Bus Operations Dispatch System   | TO | HVTMC Freeway Management System |
| Bee-Line Bus Operations Dispatch System   | TO | HVTMC Freeway Management System |
| Metro North Rail Operation Control Center | TO | HVTMC Freeway Management System |
| Metro North Rail Operation Control Center | TO | HVTMC Freeway Management System |
| Metro North Rail Operation Control Center | TO | HVTMC Freeway Management System |
| PART Bus System                           | TO | HVTMC Freeway Management System |
| PART Bus System                           | TO | HVTMC Freeway Management System |
| PART Bus System                           | TO | HVTMC Freeway Management System |
| Rockland TOR                              | TO | HVTMC Freeway Management System |
| Rockland TOR                              | TO | HVTMC Freeway Management System |
| Rockland TOR                              | TO | HVTMC Freeway Management System |

### **Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Objects for Signal Control Priority (Data Dictionary, Message Set )

## Architecture Flow

traffic control priority status

Traffic Management To Transit Management

### **Inventory**

|                                 |    |   |
|---------------------------------|----|---|
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System   |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System   |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System   |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System   |
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System   |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center |
| HVTMC Freeway Management System | TO | PART Bus System                           |
| HVTMC Freeway Management System | TO | PART Bus System                           |
| HVTMC Freeway Management System | TO | PART Bus System                           |
| HVTMC Freeway Management System | TO | PART Bus System                           |
| HVTMC Freeway Management System | TO | PART Bus System                           |
| HVTMC Freeway Management System | TO | Rockland TOR                              |
| HVTMC Freeway Management System | TO | Rockland TOR                              |
| HVTMC Freeway Management System | TO | Rockland TOR                              |
| HVTMC Freeway Management System | TO | Rockland TOR                              |
| HVTMC Freeway Management System | TO | Rockland TOR                              |

### **Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Objects for Signal Control Priority (Data Dictionary, Message Set )

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

## Architecture Flow

traffic flow

### Roadway Subsystem To Traffic Management

#### **Inventory**

|                                     |    |  |
|-------------------------------------|----|--|
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System       |
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System       |
| Local Sensors and CCTV Equipment    | TO | Westchester County Signal System       |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System     |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System     |
| Local Sensors and CCTV Equipment    | TO | White Plains Traffic Signal System     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Operations Center                |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSBA Sensors and CCTV Equipment    | TO | NYSBA Satellite Operations Centers     |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System        |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |

#### **Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Transportation System Sensor Objects (Data Dictionary, Message Set )

## Architecture Flow

traffic images

### Roadway Subsystem To Maintenance and Construction Management

#### **Inventory**

|                                   |    |                                    |
|-----------------------------------|----|------------------------------------|
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Maintenance and Construction |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Maintenance and Construction |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Maintenance and Construction |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Maintenance and Construction |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Operations Center            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Operations Center            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Operations Center            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Operations Center            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Satellite Operations Centers |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Satellite Operations Centers |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Satellite Operations Centers |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Satellite Operations Centers |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Maintenance and Construction |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Maintenance and Construction |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Maintenance and Construction |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Maintenance and Construction |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Operations Center            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Operations Center            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Operations Center            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Operations Center            |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Satellite Operations Centers |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Satellite Operations Centers |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Satellite Operations Centers |
| NYSBA Sensors and CCTV Equipment  | TO | NYSBA Satellite Operations Centers |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System    |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System    |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System    |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System    |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System    |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System    |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System    |
| NYSDOT Sensors and CCTV Equipment | TO | HVTMC Freeway Management System    |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Maintenance and Construction |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Maintenance and Construction |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Maintenance and Construction |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Maintenance and Construction |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Statewide Operations Center  |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Statewide Operations Center  |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Statewide Operations Center  |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Statewide Operations Center  |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Tarrytown Equipment Hub      |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Tarrytown Equipment Hub      |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Tarrytown Equipment Hub      |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Tarrytown Equipment Hub      |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Maintenance and Construction |
| NYSTA Sensors and CCTV Equipment  | TO | NYSTA Maintenance and Construction |

|                                     |    |  |
|-------------------------------------|----|--|
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Maintenance and Construction     |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Maintenance and Construction     |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Tarrytown Equipment Hub          |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |

**Standards**

(AASHTO/ITE/NEMA) Data Dictionary for Closed Circuit Television (CCTV) (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Object Definitions for Video Switches (Data Dictionary, Message Set )



## Architecture Flow

traffic information coordination

Other TM To Traffic Management

### **Inventory**

|                                    |    |  |
|------------------------------------|----|--|
| HVTMC Freeway Management System    | TO | NYSBA Operations Center  |
| HVTMC Freeway Management System    | TO | NYSBA Operations Center  |
| HVTMC Freeway Management System    | TO | NYSBA Operations Center  |
| HVTMC Freeway Management System    | TO | NYSTA Statewide Operations Center  |
| HVTMC Freeway Management System    | TO | NYSTA Statewide Operations Center  |
| HVTMC Freeway Management System    | TO | NYSTA Statewide Operations Center  |
| HVTMC Freeway Management System    | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| HVTMC Freeway Management System    | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| HVTMC Freeway Management System    | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| HVTMC Freeway Management System    | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| HVTMC Freeway Management System    | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| HVTMC Freeway Management System    | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Operations Center            | TO | HVTMC Freeway Management System  |
| NYSBA Operations Center            | TO | HVTMC Freeway Management System  |
| NYSBA Operations Center            | TO | HVTMC Freeway Management System  |
| NYSBA Operations Center            | TO | NYSBA Satellite Operations Centers   |
| NYSBA Operations Center            | TO | NYSBA Satellite Operations Centers   |
| NYSBA Operations Center            | TO | NYSBA Satellite Operations Centers   |
| NYSBA Operations Center            | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSBA Operations Center            | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSBA Operations Center            | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSBA Operations Center            | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Operations Center            | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Operations Center            | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Satellite Operations Centers | TO | NYSBA Operations Center  |
| NYSBA Satellite Operations Centers | TO | NYSBA Operations Center  |
| NYSBA Satellite Operations Centers | TO | NYSBA Operations Center  |
| NYSTA Statewide Operations Center  | TO | HVTMC Freeway Management System  |
| NYSTA Statewide Operations Center  | TO | HVTMC Freeway Management System  |
| NYSTA Statewide Operations Center  | TO | HVTMC Freeway Management System  |
| NYSTA Statewide Operations Center  | TO | NYSTA Tarrytown Equipment Hub  |
| NYSTA Statewide Operations Center  | TO | NYSTA Tarrytown Equipment Hub  |
| NYSTA Statewide Operations Center  | TO | NYSTA Tarrytown Equipment Hub  |
| NYSTA Statewide Operations Center  | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSTA Statewide Operations Center  | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSTA Statewide Operations Center  | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |



|  |    |  |
|--|----|--|
| HVTMC Freeway Management System  | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| HVTMC Freeway Management System  | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Operations Center  | TO | HVTMC Freeway Management System  |
| NYSBA Operations Center  | TO | HVTMC Freeway Management System  |
| NYSBA Operations Center  | TO | HVTMC Freeway Management System  |
| NYSBA Operations Center  | TO | NYSBA Satellite Operations Centers   |
| NYSBA Operations Center  | TO | NYSBA Satellite Operations Centers   |
| NYSBA Operations Center  | TO | NYSBA Satellite Operations Centers   |
| NYSBA Operations Center  | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSBA Operations Center  | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSBA Operations Center  | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSBA Operations Center  | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Operations Center  | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Operations Center  | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSBA Satellite Operations Centers   | TO | NYSBA Operations Center  |
| NYSBA Satellite Operations Centers   | TO | NYSBA Operations Center  |
| NYSBA Satellite Operations Centers   | TO | NYSBA Operations Center  |
| NYSTA Statewide Operations Center  | TO | HVTMC Freeway Management System  |
| NYSTA Statewide Operations Center  | TO | HVTMC Freeway Management System  |
| NYSTA Statewide Operations Center  | TO | HVTMC Freeway Management System  |
| NYSTA Statewide Operations Center  | TO | NYSTA Tarrytown Equipment Hub  |
| NYSTA Statewide Operations Center  | TO | NYSTA Tarrytown Equipment Hub  |
| NYSTA Statewide Operations Center  | TO | NYSTA Tarrytown Equipment Hub  |
| NYSTA Statewide Operations Center  | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSTA Statewide Operations Center  | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSTA Statewide Operations Center  | TO | Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) |
| NYSTA Statewide Operations Center  | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSTA Statewide Operations Center  | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSTA Statewide Operations Center  | TO | Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               |
| NYSTA Tarrytown Equipment Hub  | TO | NYSTA Statewide Operations Center  |
| NYSTA Tarrytown Equipment Hub  | TO | NYSTA Statewide Operations Center  |
| NYSTA Tarrytown Equipment Hub  | TO | NYSTA Statewide Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | HVTMC Freeway Management System  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | HVTMC Freeway Management System  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | HVTMC Freeway Management System  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSBA Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSBA Operations Center  |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSBA Operations Center  |

|  |    |                                   |
|--|----|-----------------------------------|
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSTA Statewide Operations Center |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSTA Statewide Operations Center |
| Other DOTs TMCs in CT & NJ (e.g. Bridgeport, Hartford CT, Northern NJ Ops) | TO | NYSTA Statewide Operations Center |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | HVTMC Freeway Management System   |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | HVTMC Freeway Management System   |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | HVTMC Freeway Management System   |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | NYSBA Operations Center           |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | NYSBA Operations Center           |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | NYSBA Operations Center           |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | NYSTA Statewide Operations Center |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | NYSTA Statewide Operations Center |
| Other TMCs in New York (e.g. NYSDOT Region 1, 10, 11, NYSBA)               | TO | NYSTA Statewide Operations Center |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(ITE) Message Sets for External TMC Communication (MS/ETMCC) (Message Set )

(ITE) Standard for Functional Level Traffic Management Data Dictionary (TMDD) (Data Dictionary)

**Architecture Flow**

traffic operator data

Traffic Management To Traffic Operations Personnel

**Inventory**

|                                   |    |   |
|-----------------------------------|----|---|
| HVTMC Freeway Management System   | TO | HVTMC Freeway Management System Operators   |
| NYSTA Statewide Operations Center | TO | NYSTA Statewide Operations Center Operators |

**Standards**

None

## Architecture Flow

traffic operator inputs

Traffic Operations Personnel To Traffic Management

### **Inventory**

|   |    |                                   |
|---|----|-----------------------------------|
| HVTMC Freeway Management System Operators   | TO | HVTMC Freeway Management System   |
| NYSTA Statewide Operations Center Operators | TO | NYSTA Statewide Operations Center |

### **Standards**

None

## Architecture Flow

traffic sensor control

Traffic Management To Roadway Subsystem

### **Inventory**

|  |    |                                     |
|--|----|-------------------------------------|
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| Westchester County Signal System       | TO | Local Sensors and CCTV Equipment    |
| Westchester County Signal System       | TO | Local Sensors and CCTV Equipment    |
| Westchester County Signal System       | TO | Local Sensors and CCTV Equipment    |
| White Plains Traffic Signal System     | TO | Local Sensors and CCTV Equipment    |
| White Plains Traffic Signal System     | TO | Local Sensors and CCTV Equipment    |
| White Plains Traffic Signal System     | TO | Local Sensors and CCTV Equipment    |

### **Standards**

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Transportation System Sensor Objects (Data Dictionary, Message Set )

**Architecture Flow**

traffic violation notification

Traffic Management To Enforcement Agency

**Inventory**

HVTMC Freeway Management System TO NYSP

Portable Speed Monitoring Stations TO NYSP

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

transaction status

Financial Institution To Toll Administration

**Inventory**

Commercial Bank TO NYSBA Toll Operations

Commercial Bank TO NYSTA Toll Operations

**Standards**

None

## Architecture Flow

transit and fare schedules

Transit Management To Information Service Provider

### **Inventory**

|   |    |  |
|---|----|--|
| Bee-Line Bus Operations Dispatch System | TO | HVTMC ITS Information Service Provider             |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC ITS Information Service Provider             |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC ITS Information Service Provider             |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC ITS Information Service Provider             |
| Bee-Line Bus Operations Dispatch System | TO | SATIN (Service Area Travelers Interactive Network) |
| Bee-Line Bus Operations Dispatch System | TO | SATIN (Service Area Travelers Interactive Network) |
| Bee-Line Bus Operations Dispatch System | TO | SATIN (Service Area Travelers Interactive Network) |
| Bee-Line Bus Operations Dispatch System | TO | SATIN (Service Area Travelers Interactive Network) |
| City / Local Transit Operations         | TO | SATIN (Service Area Travelers Interactive Network) |
| City / Local Transit Operations         | TO | SATIN (Service Area Travelers Interactive Network) |
| City / Local Transit Operations         | TO | SATIN (Service Area Travelers Interactive Network) |
| City / Local Transit Operations         | TO | SATIN (Service Area Travelers Interactive Network) |
| Dutchess LOOP Bus Dispatch System       | TO | HVTMC ITS Information Service Provider             |
| Dutchess LOOP Bus Dispatch System       | TO | HVTMC ITS Information Service Provider             |
| Dutchess LOOP Bus Dispatch System       | TO | HVTMC ITS Information Service Provider             |
| Dutchess LOOP Bus Dispatch System       | TO | HVTMC ITS Information Service Provider             |
| PART Bus System                         | TO | HVTMC ITS Information Service Provider             |
| PART Bus System                         | TO | HVTMC ITS Information Service Provider             |
| PART Bus System                         | TO | HVTMC ITS Information Service Provider             |
| PART Bus System                         | TO | HVTMC ITS Information Service Provider             |
| Rockland TOR                            | TO | HVTMC ITS Information Service Provider             |
| Rockland TOR                            | TO | HVTMC ITS Information Service Provider             |
| Rockland TOR                            | TO | HVTMC ITS Information Service Provider             |
| Rockland TOR                            | TO | HVTMC ITS Information Service Provider             |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) TCIP - Common Public Transportation (CPT) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Scheduling/Runcutting (SCH) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

## Architecture Flow

transit archive data

Transit Management To Archived Data Management Subsystem

### **Inventory**

|   |    |                                    |
|---|----|------------------------------------|
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Data Management System    |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Data Management System    |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Data Management System    |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Data Management System    |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Data Management System    |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Data Management System    |
| Metro North Rail Operation Control Center | TO | Metro North Data Management System |
| Metro North Rail Operation Control Center | TO | Metro North Data Management System |
| Metro North Rail Operation Control Center | TO | Metro North Data Management System |
| Metro North Rail Operation Control Center | TO | Metro North Data Management System |
| Metro North Rail Operation Control Center | TO | Metro North Data Management System |
| Metro North Rail Operation Control Center | TO | Metro North Data Management System |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) TCIP - Common Public Transportation (CPT) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Control Center (CC) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Fare Collection (FC) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Onboard (OB) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Passenger Information (PI) Business Area Standard (Data Dictionary, Message Set )

## Architecture Flow

transit demand management request

Traffic Management To Transit Management

### **Inventory**

|                                 |    |   |
|---------------------------------|----|---|
| HVTMC Freeway Management System | TO | Bee-Line Bus Operations Dispatch System   |
| HVTMC Freeway Management System | TO | Metro North Rail Operation Control Center |
| HVTMC Freeway Management System | TO | PART Bus System                           |
| HVTMC Freeway Management System | TO | Rockland TOR                              |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)



**Architecture Flow**

transit demand management response

Transit Management To Traffic Management

**Inventory**

|   |    |                                 |
|---|----|---------------------------------|
| Bee-Line Bus Operations Dispatch System | TO | HVTMC Freeway Management System |
| PART Bus System                         | TO | HVTMC Freeway Management System |
| Rockland TOR                            | TO | HVTMC Freeway Management System |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

transit driver availability

Transit Driver To Transit Management

**Inventory**

|                             |    |   |
|-----------------------------|----|---|
| Bee-Line Bus Driver         | TO | Bee-Line Bus Operations Dispatch System   |
| Dutchess LOOP Bus Driver    | TO | Dutchess LOOP Bus Dispatch System         |
| Metro North Train Engineers | TO | Metro North Rail Operation Control Center |
| PART Bus Driver             | TO | PART Bus System                           |
| Rockland TOR Bus Driver     | TO | Rockland TOR                              |

**Standards**

None

## Architecture Flow

transit driver display

Transit Vehicle Subsystem To Transit Driver

### **Inventory**

|   |    |                             |
|---|----|-----------------------------|
| Bee-Line Bus Vehicles Communications Equipment          | TO | Bee-Line Bus Driver         |
| Bee-Line Bus Vehicles IT Equipment                      | TO | Bee-Line Bus Driver         |
| Bee-Line Para Transit Vehicles Communications Equipment | TO | Bee-Line Bus Driver         |
| Dutchess LOOP Bus Vehicles Communications Equipment     | TO | Dutchess LOOP Bus Driver    |
| Dutchess LOOP Bus Vehicles IT Equipment                 | TO | Dutchess LOOP Bus Driver    |
| Metro North Rail Vehicles Communications Equipment      | TO | Metro North Train Engineers |
| Metro North Rail Vehicles IT Equipment                  | TO | Metro North Train Engineers |
| PART Bus Vehicles Communications Equipment              | TO | PART Bus Driver             |
| PART Bus Vehicles IT Equipment                          | TO | PART Bus Driver             |
| Rockland TOR Bus Vehicles Communications Equipment      | TO | Rockland TOR Bus Driver     |
| Rockland TOR Bus Vehicles IT Equipment                  | TO | Rockland TOR Bus Driver     |

### **Standards**

None

## Architecture Flow

transit driver inputs

Transit Driver To Transit Vehicle Subsystem

### **Inventory**

|                             |    |   |
|-----------------------------|----|---|
| Bee-Line Bus Driver         | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Driver         | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Driver         | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Dutchess LOOP Bus Driver    | TO | Dutchess LOOP Bus Vehicles Communications Equipment     |
| Dutchess LOOP Bus Driver    | TO | Dutchess LOOP Bus Vehicles IT Equipment                 |
| Metro North Train Engineers | TO | Metro North Rail Vehicles Communications Equipment      |
| Metro North Train Engineers | TO | Metro North Rail Vehicles IT Equipment                  |
| PART Bus Driver             | TO | PART Bus Vehicles Communications Equipment              |
| PART Bus Driver             | TO | PART Bus Vehicles IT Equipment                          |
| Rockland TOR Bus Driver     | TO | Rockland TOR Bus Vehicles Communications Equipment      |
| Rockland TOR Bus Driver     | TO | Rockland TOR Bus Vehicles IT Equipment                  |

### **Standards**

None

## Architecture Flow

transit emergency coordination data

Emergency Management To Transit Management

### **Inventory**

|                                     |    |   |
|-------------------------------------|----|---|
| Local Emergency Dispatch            | TO | Bee-Line Bus Operations Dispatch System   |
| Local Emergency Dispatch            | TO | Bee-Line Bus Operations Dispatch System   |
| Local Emergency Dispatch            | TO | Bee-Line Bus Operations Dispatch System   |
| Local Emergency Dispatch            | TO | City / Local Transit Operations           |
| Local Emergency Dispatch            | TO | City / Local Transit Operations           |
| Local Emergency Dispatch            | TO | City / Local Transit Operations           |
| Local Emergency Dispatch            | TO | Dutchess LOOP Bus Dispatch System         |
| Local Emergency Dispatch            | TO | Dutchess LOOP Bus Dispatch System         |
| Local Emergency Dispatch            | TO | Dutchess LOOP Bus Dispatch System         |
| Local Emergency Dispatch            | TO | PART Bus System                           |
| Local Emergency Dispatch            | TO | PART Bus System                           |
| Local Emergency Dispatch            | TO | PART Bus System                           |
| Local Emergency Dispatch            | TO | Rockland TOR                              |
| Local Emergency Dispatch            | TO | Rockland TOR                              |
| Local Emergency Dispatch            | TO | Rockland TOR                              |
| MTA Police                          | TO | Metro North Rail Operation Control Center |
| MTA Police                          | TO | Metro North Rail Operation Control Center |
| MTA Police                          | TO | Metro North Rail Operation Control Center |
| NYSP Central Communication/Dispatch | TO | Bee-Line Bus Operations Dispatch System   |
| NYSP Central Communication/Dispatch | TO | Bee-Line Bus Operations Dispatch System   |
| NYSP Central Communication/Dispatch | TO | Bee-Line Bus Operations Dispatch System   |
| NYSP Central Communication/Dispatch | TO | Dutchess LOOP Bus Dispatch System         |
| NYSP Central Communication/Dispatch | TO | Dutchess LOOP Bus Dispatch System         |
| NYSP Central Communication/Dispatch | TO | Dutchess LOOP Bus Dispatch System         |
| NYSP Central Communication/Dispatch | TO | PART Bus System                           |
| NYSP Central Communication/Dispatch | TO | PART Bus System                           |
| NYSP Central Communication/Dispatch | TO | PART Bus System                           |
| NYSP Central Communication/Dispatch | TO | Rockland TOR                              |
| NYSP Central Communication/Dispatch | TO | Rockland TOR                              |
| NYSP Central Communication/Dispatch | TO | Rockland TOR                              |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(IEEE) Standard for Common Incident Management Message Sets (IMMS) for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

## Architecture Flow

transit emergency data

### Transit Management To Emergency Management

#### Inventory

|   |    |                                     |
|---|----|-------------------------------------|
| Bee-Line Bus Operations Dispatch System   | TO | Local Emergency Dispatch            |
| Bee-Line Bus Operations Dispatch System   | TO | Local Emergency Dispatch            |
| Bee-Line Bus Operations Dispatch System   | TO | Local Emergency Dispatch            |
| Bee-Line Bus Operations Dispatch System   | TO | Local Emergency Dispatch            |
| Bee-Line Bus Operations Dispatch System   | TO | Local Emergency Dispatch            |
| Bee-Line Bus Operations Dispatch System   | TO | Local Emergency Dispatch            |
| Bee-Line Bus Operations Dispatch System   | TO | NYSP Central Communication/Dispatch |
| Bee-Line Bus Operations Dispatch System   | TO | NYSP Central Communication/Dispatch |
| Bee-Line Bus Operations Dispatch System   | TO | NYSP Central Communication/Dispatch |
| Bee-Line Bus Operations Dispatch System   | TO | NYSP Central Communication/Dispatch |
| Bee-Line Bus Operations Dispatch System   | TO | NYSP Central Communication/Dispatch |
| Bee-Line Bus Operations Dispatch System   | TO | NYSP Central Communication/Dispatch |
| City / Local Transit Operations           | TO | Local Emergency Dispatch            |
| City / Local Transit Operations           | TO | Local Emergency Dispatch            |
| City / Local Transit Operations           | TO | Local Emergency Dispatch            |
| City / Local Transit Operations           | TO | Local Emergency Dispatch            |
| City / Local Transit Operations           | TO | Local Emergency Dispatch            |
| City / Local Transit Operations           | TO | Local Emergency Dispatch            |
| Dutchess LOOP Bus Dispatch System         | TO | Local Emergency Dispatch            |
| Dutchess LOOP Bus Dispatch System         | TO | Local Emergency Dispatch            |
| Dutchess LOOP Bus Dispatch System         | TO | Local Emergency Dispatch            |
| Dutchess LOOP Bus Dispatch System         | TO | Local Emergency Dispatch            |
| Dutchess LOOP Bus Dispatch System         | TO | Local Emergency Dispatch            |
| Dutchess LOOP Bus Dispatch System         | TO | Local Emergency Dispatch            |
| Dutchess LOOP Bus Dispatch System         | TO | NYSP Central Communication/Dispatch |
| Dutchess LOOP Bus Dispatch System         | TO | NYSP Central Communication/Dispatch |
| Dutchess LOOP Bus Dispatch System         | TO | NYSP Central Communication/Dispatch |
| Dutchess LOOP Bus Dispatch System         | TO | NYSP Central Communication/Dispatch |
| Dutchess LOOP Bus Dispatch System         | TO | NYSP Central Communication/Dispatch |
| Dutchess LOOP Bus Dispatch System         | TO | NYSP Central Communication/Dispatch |
| Dutchess LOOP Bus Dispatch System         | TO | NYSP Central Communication/Dispatch |
| Metro North Rail Operation Control Center | TO | MTA Police                          |
| Metro North Rail Operation Control Center | TO | MTA Police                          |
| Metro North Rail Operation Control Center | TO | MTA Police                          |
| Metro North Rail Operation Control Center | TO | MTA Police                          |
| Metro North Rail Operation Control Center | TO | MTA Police                          |
| Metro North Rail Operation Control Center | TO | MTA Police                          |
| PART Bus System                           | TO | Local Emergency Dispatch            |
| PART Bus System                           | TO | Local Emergency Dispatch            |
| PART Bus System                           | TO | Local Emergency Dispatch            |
| PART Bus System                           | TO | Local Emergency Dispatch            |
| PART Bus System                           | TO | Local Emergency Dispatch            |
| PART Bus System                           | TO | Local Emergency Dispatch            |
| PART Bus System                           | TO | NYSP Central Communication/Dispatch |
| PART Bus System                           | TO | NYSP Central Communication/Dispatch |
| PART Bus System                           | TO | NYSP Central Communication/Dispatch |
| PART Bus System                           | TO | NYSP Central Communication/Dispatch |

|                 |    |                                     |
|-----------------|----|-------------------------------------|
| PART Bus System | TO | NYSP Central Communication/Dispatch |
| PART Bus System | TO | NYSP Central Communication/Dispatch |
| Rockland TOR    | TO | Local Emergency Dispatch            |
| Rockland TOR    | TO | Local Emergency Dispatch            |
| Rockland TOR    | TO | Local Emergency Dispatch            |
| Rockland TOR    | TO | Local Emergency Dispatch            |
| Rockland TOR    | TO | Local Emergency Dispatch            |
| Rockland TOR    | TO | Local Emergency Dispatch            |
| Rockland TOR    | TO | Local Emergency Dispatch            |
| Rockland TOR    | TO | NYSP Central Communication/Dispatch |
| Rockland TOR    | TO | NYSP Central Communication/Dispatch |
| Rockland TOR    | TO | NYSP Central Communication/Dispatch |
| Rockland TOR    | TO | NYSP Central Communication/Dispatch |
| Rockland TOR    | TO | NYSP Central Communication/Dispatch |
| Rockland TOR    | TO | NYSP Central Communication/Dispatch |
| Rockland TOR    | TO | NYSP Central Communication/Dispatch |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) TCIP - Common Public Transportation (CPT) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Incident Management (IM) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

(IEEE) Standard for Common Incident Management Message Sets (IMMS) for use by EMCs (Data Dictionary, Message Set )

(IEEE) Standard for Emergency Management Data Dictionary (Data Dictionary)

**Architecture Flow**

transit fleet manager inputs

Transit Fleet Manager To Transit Management

**Inventory**

|  |    |   |
|--|----|---|
| Bee-Line Fleet Operations Manager          | TO | Bee-Line Bus Operations Dispatch System   |
| Dutchess LOOP Bus Fleet Operations Manager | TO | Dutchess LOOP Bus Dispatch System         |
| Metro North Fleet Operations Manager       | TO | Metro North Rail Operation Control Center |
| PART Bus Fleet Operations Manager          | TO | PART Bus System                           |
| Rockland TOR Bus Fleet Operations Manager  | TO | Rockland TOR                              |

**Standards**

None

## Architecture Flow

transit incident information

Transit Management To Information Service Provider

### **Inventory**

|   |    |  |
|---|----|--|
| Bee-Line Bus Operations Dispatch System | TO | HVTMC ITS Information Service Provider             |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC ITS Information Service Provider             |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC ITS Information Service Provider             |
| Bee-Line Bus Operations Dispatch System | TO | HVTMC ITS Information Service Provider             |
| Bee-Line Bus Operations Dispatch System | TO | SATIN (Service Area Travelers Interactive Network) |
| Bee-Line Bus Operations Dispatch System | TO | SATIN (Service Area Travelers Interactive Network) |
| Bee-Line Bus Operations Dispatch System | TO | SATIN (Service Area Travelers Interactive Network) |
| Bee-Line Bus Operations Dispatch System | TO | SATIN (Service Area Travelers Interactive Network) |
| City / Local Transit Operations         | TO | SATIN (Service Area Travelers Interactive Network) |
| City / Local Transit Operations         | TO | SATIN (Service Area Travelers Interactive Network) |
| City / Local Transit Operations         | TO | SATIN (Service Area Travelers Interactive Network) |
| City / Local Transit Operations         | TO | SATIN (Service Area Travelers Interactive Network) |
| Dutchess LOOP Bus Dispatch System       | TO | HVTMC ITS Information Service Provider             |
| Dutchess LOOP Bus Dispatch System       | TO | HVTMC ITS Information Service Provider             |
| Dutchess LOOP Bus Dispatch System       | TO | HVTMC ITS Information Service Provider             |
| Dutchess LOOP Bus Dispatch System       | TO | HVTMC ITS Information Service Provider             |
| PART Bus System                         | TO | HVTMC ITS Information Service Provider             |
| PART Bus System                         | TO | HVTMC ITS Information Service Provider             |
| PART Bus System                         | TO | HVTMC ITS Information Service Provider             |
| PART Bus System                         | TO | HVTMC ITS Information Service Provider             |
| Rockland TOR                            | TO | HVTMC ITS Information Service Provider             |
| Rockland TOR                            | TO | HVTMC ITS Information Service Provider             |
| Rockland TOR                            | TO | HVTMC ITS Information Service Provider             |
| Rockland TOR                            | TO | HVTMC ITS Information Service Provider             |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) TCIP - Common Public Transportation (CPT) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Incident Management (IM) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

**Architecture Flow**

transit incidents for media

Transit Management To Media

**Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Operations Dispatch System   | TO | Media Traffic and Travel Information System |
| City / Local Transit Operations           | TO | Media Traffic and Travel Information System |
| Dutchess LOOP Bus Dispatch System         | TO | Media Traffic and Travel Information System |
| Metro North Rail Operation Control Center | TO | Media Traffic and Travel Information System |
| PART Bus System                           | TO | Media Traffic and Travel Information System |
| Rockland TOR                              | TO | Media Traffic and Travel Information System |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

transit information for media

Transit Management To Media

**Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Operations Dispatch System   | TO | Media Traffic and Travel Information System |
| City / Local Transit Operations           | TO | Media Traffic and Travel Information System |
| Dutchess LOOP Bus Dispatch System         | TO | Media Traffic and Travel Information System |
| Metro North Rail Operation Control Center | TO | Media Traffic and Travel Information System |
| PART Bus System                           | TO | Media Traffic and Travel Information System |
| Rockland TOR                              | TO | Media Traffic and Travel Information System |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

## Architecture Flow

transit information request

Information Service Provider To Transit Management

### **Inventory**

|  |    |   |
|--|----|---|
| HVTMC ITS Information Service Provider             | TO | Bee-Line Bus Operations Dispatch System |
| HVTMC ITS Information Service Provider             | TO | Bee-Line Bus Operations Dispatch System |
| HVTMC ITS Information Service Provider             | TO | Bee-Line Bus Operations Dispatch System |
| HVTMC ITS Information Service Provider             | TO | Bee-Line Bus Operations Dispatch System |
| HVTMC ITS Information Service Provider             | TO | Bee-Line Bus Operations Dispatch System |
| HVTMC ITS Information Service Provider             | TO | Bee-Line Bus Operations Dispatch System |
| HVTMC ITS Information Service Provider             | TO | Bee-Line Bus Operations Dispatch System |
| HVTMC ITS Information Service Provider             | TO | Bee-Line Bus Operations Dispatch System |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | Dutchess LOOP Bus Dispatch System       |
| HVTMC ITS Information Service Provider             | TO | PART Bus System                         |
| HVTMC ITS Information Service Provider             | TO | PART Bus System                         |
| HVTMC ITS Information Service Provider             | TO | PART Bus System                         |
| HVTMC ITS Information Service Provider             | TO | PART Bus System                         |
| HVTMC ITS Information Service Provider             | TO | PART Bus System                         |
| HVTMC ITS Information Service Provider             | TO | PART Bus System                         |
| HVTMC ITS Information Service Provider             | TO | PART Bus System                         |
| HVTMC ITS Information Service Provider             | TO | PART Bus System                         |
| HVTMC ITS Information Service Provider             | TO | Rockland TOR                            |
| HVTMC ITS Information Service Provider             | TO | Rockland TOR                            |
| HVTMC ITS Information Service Provider             | TO | Rockland TOR                            |
| HVTMC ITS Information Service Provider             | TO | Rockland TOR                            |
| HVTMC ITS Information Service Provider             | TO | Rockland TOR                            |
| HVTMC ITS Information Service Provider             | TO | Rockland TOR                            |
| HVTMC ITS Information Service Provider             | TO | Rockland TOR                            |
| HVTMC ITS Information Service Provider             | TO | Rockland TOR                            |
| SATIN (Service Area Travelers Interactive Network) | TO | Bee-Line Bus Operations Dispatch System |
| SATIN (Service Area Travelers Interactive Network) | TO | Bee-Line Bus Operations Dispatch System |
| SATIN (Service Area Travelers Interactive Network) | TO | Bee-Line Bus Operations Dispatch System |
| SATIN (Service Area Travelers Interactive Network) | TO | Bee-Line Bus Operations Dispatch System |
| SATIN (Service Area Travelers Interactive Network) | TO | Bee-Line Bus Operations Dispatch System |
| SATIN (Service Area Travelers Interactive Network) | TO | Bee-Line Bus Operations Dispatch System |
| SATIN (Service Area Travelers Interactive Network) | TO | Bee-Line Bus Operations Dispatch System |
| SATIN (Service Area Travelers Interactive Network) | TO | City / Local Transit Operations         |
| SATIN (Service Area Travelers Interactive Network) | TO | City / Local Transit Operations         |
| SATIN (Service Area Travelers Interactive Network) | TO | City / Local Transit Operations         |



|  |    |                                 |
|--|----|---------------------------------|
| SATIN (Service Area Travelers Interactive Network) | TO | City / Local Transit Operations |
| SATIN (Service Area Travelers Interactive Network) | TO | City / Local Transit Operations |
| SATIN (Service Area Travelers Interactive Network) | TO | City / Local Transit Operations |
| SATIN (Service Area Travelers Interactive Network) | TO | City / Local Transit Operations |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) TCIP - Passenger Information (PI) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

transit information user request

Personal Information Access To Transit Management

### **Inventory**

|  |    |   |
|--|----|---|
| Traveler Cellular and Land-Line Telephones | TO | Bee-Line Bus Operations Dispatch System |
| Traveler Cellular and Land-Line Telephones | TO | Bee-Line Bus Operations Dispatch System |
| Traveler Cellular and Land-Line Telephones | TO | Bee-Line Bus Operations Dispatch System |
| Traveler Cellular and Land-Line Telephones | TO | Bee-Line Bus Operations Dispatch System |
| Traveler Cellular and Land-Line Telephones | TO | Bee-Line Bus Operations Dispatch System |
| Traveler Cellular and Land-Line Telephones | TO | Bee-Line Bus Operations Dispatch System |
| Traveler Cellular and Land-Line Telephones | TO | Bee-Line Bus Operations Dispatch System |
| Traveler Cellular and Land-Line Telephones | TO | Bee-Line Bus Operations Dispatch System |
| Traveler Cellular and Land-Line Telephones | TO | Bee-Line Bus Operations Dispatch System |
| Traveler Cellular and Land-Line Telephones | TO | Bee-Line Bus Operations Dispatch System |
| Traveler Cellular and Land-Line Telephones | TO | Bee-Line Bus Operations Dispatch System |
| Traveler Cellular and Land-Line Telephones | TO | Bee-Line Bus Operations Dispatch System |
| Traveler Cellular and Land-Line Telephones | TO | Bee-Line Bus Operations Dispatch System |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) TCIP - Passenger Information (PI) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

transit multimodal information

Transit Management To Multimodal Transportation Service Provider

### **Inventory**

|   |    |  |
|---|----|--|
| Bee-Line Bus Operations Dispatch System   | TO | Ferrys, Airports etc Information Systems |
| Bee-Line Bus Operations Dispatch System   | TO | Ferrys, Airports etc Information Systems |
| Bee-Line Bus Operations Dispatch System   | TO | Ferrys, Airports etc Information Systems |
| Bee-Line Bus Operations Dispatch System   | TO | Ferrys, Airports etc Information Systems |
| City / Local Transit Operations           | TO | Ferrys, Airports etc Information Systems |
| City / Local Transit Operations           | TO | Ferrys, Airports etc Information Systems |
| City / Local Transit Operations           | TO | Ferrys, Airports etc Information Systems |
| City / Local Transit Operations           | TO | Ferrys, Airports etc Information Systems |
| Dutchess LOOP Bus Dispatch System         | TO | Ferrys, Airports etc Information Systems |
| Dutchess LOOP Bus Dispatch System         | TO | Ferrys, Airports etc Information Systems |
| Dutchess LOOP Bus Dispatch System         | TO | Ferrys, Airports etc Information Systems |
| Dutchess LOOP Bus Dispatch System         | TO | Ferrys, Airports etc Information Systems |
| Metro North Rail Operation Control Center | TO | Ferrys, Airports etc Information Systems |
| Metro North Rail Operation Control Center | TO | Ferrys, Airports etc Information Systems |
| Metro North Rail Operation Control Center | TO | Ferrys, Airports etc Information Systems |
| Metro North Rail Operation Control Center | TO | Ferrys, Airports etc Information Systems |
| PART Bus System                           | TO | Ferrys, Airports etc Information Systems |
| PART Bus System                           | TO | Ferrys, Airports etc Information Systems |
| PART Bus System                           | TO | Ferrys, Airports etc Information Systems |
| PART Bus System                           | TO | Ferrys, Airports etc Information Systems |
| Rockland TOR                              | TO | Ferrys, Airports etc Information Systems |
| Rockland TOR                              | TO | Ferrys, Airports etc Information Systems |
| Rockland TOR                              | TO | Ferrys, Airports etc Information Systems |
| Rockland TOR                              | TO | Ferrys, Airports etc Information Systems |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) TCIP - Common Public Transportation (CPT) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Control Center (CC) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

**Architecture Flow**

transit operations planning data

Transit Management To Transit Fleet Manager

**Inventory**

|   |    |  |
|---|----|--|
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Fleet Operations Manager          |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Fleet Operations Manager |
| Metro North Rail Operation Control Center | TO | Metro North Fleet Operations Manager       |
| PART Bus System                           | TO | PART Bus Fleet Operations Manager          |
| Rockland TOR                              | TO | Rockland TOR Bus Fleet Operations Manager  |

**Standards**

None

**Architecture Flow**

transit operator display

Transit Management To Transit System Operators

**Inventory**

|   |    |  |
|---|----|--|
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Transit Operators (Day-to-Day Activity Managers)                        |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Transit Operators (Day-to-Day Activity Managers)                   |
| Metro North Rail Operation Control Center | TO | Metro North Superintendent of Operations Services (Day-to-Day Activity Managers) |
| PART Bus System                           | TO | PART Transit Operators (Day-to-Day Activity Managers)                            |
| Rockland TOR                              | TO | Rockland TOR Transit Operators (Day-to-Day Activity Managers)                    |

**Standards**

None

**Architecture Flow**

transit operator management data

Transit System Operators To Transit Management

**Inventory**

|  |    |   |
|--|----|---|
| Bee-Line Transit Operators (Day-to-Day Activity Managers)                        | TO | Bee-Line Bus Operations Dispatch System   |
| Dutchess LOOP Transit Operators (Day-to-Day Activity Managers)                   | TO | Dutchess LOOP Bus Dispatch System         |
| Metro North Superintendent of Operations Services (Day-to-Day Activity Managers) | TO | Metro North Rail Operation Control Center |
| PART Transit Operators (Day-to-Day Activity Managers)                            | TO | PART Bus System                           |
| Rockland TOR Transit Operators (Day-to-Day Activity Managers)                    | TO | Rockland TOR                              |

**Standards**

None

**Architecture Flow**

transit request confirmation

Transit Management To Information Service Provider

**Inventory**

|   |    |  |
|---|----|--|
| Bee-Line Bus Operations Dispatch System | TO | HVTMC ITS Information Service Provider             |
| Bee-Line Bus Operations Dispatch System | TO | SATIN (Service Area Travelers Interactive Network) |
| City / Local Transit Operations         | TO | SATIN (Service Area Travelers Interactive Network) |
| Dutchess LOOP Bus Dispatch System       | TO | HVTMC ITS Information Service Provider             |
| PART Bus System                         | TO | HVTMC ITS Information Service Provider             |
| Rockland TOR                            | TO | HVTMC ITS Information Service Provider             |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

## Architecture Flow

transit schedule information

### Transit Management To Transit Vehicle Subsystem

#### **Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles Communications Equipment     |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles Communications Equipment     |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles Communications Equipment     |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles Communications Equipment     |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles IT Equipment                 |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles IT Equipment                 |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles IT Equipment                 |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicles IT Equipment                 |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles Communications Equipment      |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles Communications Equipment      |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles Communications Equipment      |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles IT Equipment                  |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles IT Equipment                  |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles IT Equipment                  |
| Metro North Rail Operation Control Center | TO | Metro North Rail Vehicles IT Equipment                  |
| PART Bus System                           | TO | PART Bus Vehicles Communications Equipment              |
| PART Bus System                           | TO | PART Bus Vehicles Communications Equipment              |
| PART Bus System                           | TO | PART Bus Vehicles Communications Equipment              |
| PART Bus System                           | TO | PART Bus Vehicles Communications Equipment              |

|                 |   |
|-----------------|---|
| PART Bus System | TO PART Bus Vehicles IT Equipment                     |
| PART Bus System | TO PART Bus Vehicles IT Equipment                     |
| PART Bus System | TO PART Bus Vehicles IT Equipment                     |
| PART Bus System | TO PART Bus Vehicles IT Equipment                     |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles IT Equipment             |
| Rockland TOR    | TO Rockland TOR Bus Vehicles IT Equipment             |
| Rockland TOR    | TO Rockland TOR Bus Vehicles IT Equipment             |
| Rockland TOR    | TO Rockland TOR Bus Vehicles IT Equipment             |

**Standards**

(AASHTO/ITE/NEMA) TCIP - Common Public Transportation (CPT) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Control Center (CC) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Scheduling/Runcutting (SCH) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

## Architecture Flow

transit system data

Transit Management To Traffic Management

### **Inventory**

|   |    |                                 |
|---|----|---------------------------------|
| Bee-Line Bus Operations Dispatch System   | TO | HVTMC Freeway Management System |
| Bee-Line Bus Operations Dispatch System   | TO | HVTMC Freeway Management System |
| Bee-Line Bus Operations Dispatch System   | TO | HVTMC Freeway Management System |
| Bee-Line Bus Operations Dispatch System   | TO | HVTMC Freeway Management System |
| Bee-Line Bus Operations Dispatch System   | TO | HVTMC Freeway Management System |
| Metro North Rail Operation Control Center | TO | HVTMC Freeway Management System |
| Metro North Rail Operation Control Center | TO | HVTMC Freeway Management System |
| Metro North Rail Operation Control Center | TO | HVTMC Freeway Management System |
| Metro North Rail Operation Control Center | TO | HVTMC Freeway Management System |
| Metro North Rail Operation Control Center | TO | HVTMC Freeway Management System |
| PART Bus System                           | TO | HVTMC Freeway Management System |
| PART Bus System                           | TO | HVTMC Freeway Management System |
| PART Bus System                           | TO | HVTMC Freeway Management System |
| PART Bus System                           | TO | HVTMC Freeway Management System |
| PART Bus System                           | TO | HVTMC Freeway Management System |
| Rockland TOR                              | TO | HVTMC Freeway Management System |
| Rockland TOR                              | TO | HVTMC Freeway Management System |
| Rockland TOR                              | TO | HVTMC Freeway Management System |
| Rockland TOR                              | TO | HVTMC Freeway Management System |
| Rockland TOR                              | TO | HVTMC Freeway Management System |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) TCIP - Common Public Transportation (CPT) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Control Center (CC) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

(ITE) TCIP - Traffic Management (TM) Business Area Standard (Data Dictionary, Message Set )



## Architecture Flow

transit traveler information

### Transit Management To Remote Traveler Support

#### **Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Station Displays                           |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Station Displays                           |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Station Displays                           |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Station Displays                           |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Station Displays                           |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Station Displays                           |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Station Displays                           |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Station Displays                           |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Station Displays                           |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles Communications Equipment          |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Vehicles IT Equipment                      |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Para Transit Vehicles Communications Equipment |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Station Displays                           |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Station Displays                           |
| Bee-Line Bus Operations Dispatch System | TO | Bee-Line Bus Station Displays                           |







|                 |   |
|-----------------|---|
| PART Bus System | TO PART Bus Vehicles Communications Equipment         |
| PART Bus System | TO PART Bus Vehicles Communications Equipment         |
| PART Bus System | TO PART Bus Vehicles Communications Equipment         |
| PART Bus System | TO PART Bus Vehicles Communications Equipment         |
| PART Bus System | TO PART Bus Vehicles Communications Equipment         |
| PART Bus System | TO PART Bus Vehicles IT Equipment                     |
| PART Bus System | TO PART Bus Vehicles IT Equipment                     |
| PART Bus System | TO PART Bus Vehicles IT Equipment                     |
| PART Bus System | TO PART Bus Vehicles IT Equipment                     |
| PART Bus System | TO PART Bus Vehicles IT Equipment                     |
| PART Bus System | TO PART Bus Vehicles IT Equipment                     |
| PART Bus System | TO PART Bus Vehicles IT Equipment                     |
| PART Bus System | TO PART Bus Vehicles IT Equipment                     |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles IT Equipment             |
| Rockland TOR    | TO Rockland TOR Bus Vehicles IT Equipment             |
| Rockland TOR    | TO Rockland TOR Bus Vehicles IT Equipment             |
| Rockland TOR    | TO Rockland TOR Bus Vehicles IT Equipment             |
| Rockland TOR    | TO Rockland TOR Bus Vehicles IT Equipment             |
| Rockland TOR    | TO Rockland TOR Bus Vehicles IT Equipment             |
| Rockland TOR    | TO Rockland TOR Bus Vehicles IT Equipment             |
| Rockland TOR    | TO Rockland TOR Bus Vehicles IT Equipment             |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles Communications Equipment |
| Rockland TOR    | TO Rockland TOR Bus Vehicles IT Equipment             |
| Rockland TOR    | TO Rockland TOR Bus Vehicles IT Equipment             |
| Rockland TOR    | TO Rockland TOR Bus Vehicles IT Equipment             |

|              |    |  |
|--------------|----|--|
| Rockland TOR | TO | Rockland TOR Bus Vehicles IT Equipment |
| Rockland TOR | TO | Rockland TOR Bus Vehicles IT Equipment |
| Rockland TOR | TO | Rockland TOR Bus Vehicles IT Equipment |
| Rockland TOR | TO | Rockland TOR Bus Vehicles IT Equipment |

## **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) TCIP - Common Public Transportation (CPT) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Passenger Information (PI) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

transit traveler request

Transit Vehicle Subsystem To Transit Management

### **Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Vehicles Communications Equipment          | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles Communications Equipment          | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment                      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment                      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Para Transit Vehicles Communications Equipment | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Para Transit Vehicles Communications Equipment | TO | Bee-Line Bus Operations Dispatch System   |
| Dutchess LOOP Bus Vehicles Communications Equipment     | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles Communications Equipment     | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment                 | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment                 | TO | Dutchess LOOP Bus Dispatch System         |
| Metro North Rail Vehicles Communications Equipment      | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles Communications Equipment      | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment                  | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment                  | TO | Metro North Rail Operation Control Center |
| PART Bus Vehicles Communications Equipment              | TO | PART Bus System                           |
| PART Bus Vehicles Communications Equipment              | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment                          | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment                          | TO | PART Bus System                           |
| Rockland TOR Bus Vehicles Communications Equipment      | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles Communications Equipment      | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment                  | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment                  | TO | Rockland TOR                              |

### **Standards**

(AASHTO/ITE/NEMA) TCIP - Passenger Information (PI) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

**Architecture Flow**

transit user fare status

Remote Traveler Support To Transit User

**Inventory**

NYSDOT Kiosks TO Individual Using Transportation Services

NYSTA Service Plaza Kiosks TO Individual Using Transportation Services

**Standards**

None

**Architecture Flow**

transit user inputs

Transit User To Remote Traveler Support

**Inventory**

Individual Using Transportation Services TO NYSDOT Kiosks

Individual Using Transportation Services TO NYSTA Service Plaza Kiosks

**Standards**

None

**Architecture Flow**

transit user outputs

Remote Traveler Support To Transit User

**Inventory**

Metro North Audio Announcement Devices TO Individual Using Transportation Services

NYSDOT Kiosks TO Individual Using Transportation Services

NYSTA Service Plaza Kiosks TO Individual Using Transportation Services

**Standards**

None



## Architecture Flow

transit vehicle conditions

Transit Vehicle Subsystem To Transit Management

### **Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Vehicles Communications Equipment          | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment                      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Para Transit Vehicles Communications Equipment | TO | Bee-Line Bus Operations Dispatch System   |
| Dutchess LOOP Bus Vehicles Communications Equipment     | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment                 | TO | Dutchess LOOP Bus Dispatch System         |
| Metro North Rail Vehicles Communications Equipment      | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment                  | TO | Metro North Rail Operation Control Center |
| PART Bus Vehicles Communications Equipment              | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment                          | TO | PART Bus System                           |
| Rockland TOR Bus Vehicles Communications Equipment      | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment                  | TO | Rockland TOR                              |

### **Standards**

(AASHTO/ITE/NEMA) TCIP - Onboard (OB) Business Area Standard (Data Dictionary, Message Set )

## Architecture Flow

transit vehicle location data

### Transit Vehicle Subsystem To Transit Management

#### **Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Vehicles Communications Equipment          | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles Communications Equipment          | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment                      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment                      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Para Transit Vehicles Communications Equipment | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Para Transit Vehicles Communications Equipment | TO | Bee-Line Bus Operations Dispatch System   |
| Dutchess LOOP Bus Vehicles Communications Equipment     | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles Communications Equipment     | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment                 | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment                 | TO | Dutchess LOOP Bus Dispatch System         |
| Metro North Rail Vehicles Communications Equipment      | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles Communications Equipment      | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment                  | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment                  | TO | Metro North Rail Operation Control Center |
| PART Bus Vehicles Communications Equipment              | TO | PART Bus System                           |
| PART Bus Vehicles Communications Equipment              | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment                          | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment                          | TO | PART Bus System                           |
| Rockland TOR Bus Vehicles Communications Equipment      | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles Communications Equipment      | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment                  | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment                  | TO | Rockland TOR                              |

#### **Standards**

(AASHTO/ITE/NEMA) TCIP - Common Public Transportation (CPT) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Onboard (OB) Business Area Standard (Data Dictionary, Message Set )

**Architecture Flow**

transit vehicle measures

Basic Transit Vehicle To Transit Vehicle Subsystem

**Inventory**

|                                   |    |   |
|-----------------------------------|----|---|
| Transit fare Collection Equipment | TO | Bee-Line Bus Vehicles IT Equipment      |
| Transit fare Collection Equipment | TO | Dutchess LOOP Bus Vehicles IT Equipment |
| Transit fare Collection Equipment | TO | PART Bus Vehicles IT Equipment          |
| Transit fare Collection Equipment | TO | Rockland TOR Bus Vehicles IT Equipment  |

**Standards**

(AASHTO/ITE/NEMA) TCIP - Onboard (OB) Business Area Standard (Data Dictionary, Message Set )

**Architecture Flow**

transit vehicle passenger and use data

Transit Vehicle Subsystem To Transit Management

**Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Vehicles IT Equipment      | TO | Bee-Line Bus Operations Dispatch System   |
| Dutchess LOOP Bus Vehicles IT Equipment | TO | Dutchess LOOP Bus Dispatch System         |
| Metro North Rail Vehicles IT Equipment  | TO | Metro North Rail Operation Control Center |
| PART Bus Vehicles IT Equipment          | TO | PART Bus System                           |
| Rockland TOR Bus Vehicles IT Equipment  | TO | Rockland TOR                              |

**Standards**

(AASHTO/ITE/NEMA) TCIP - Onboard (OB) Business Area Standard (Data Dictionary, Message Set )

## Architecture Flow

transit vehicle schedule performance

Transit Vehicle Subsystem To Transit Management

### **Inventory**

|   |    |   |
|---|----|---|
| Bee-Line Bus Vehicles IT Equipment      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment      | TO | Bee-Line Bus Operations Dispatch System   |
| Bee-Line Bus Vehicles IT Equipment      | TO | Bee-Line Bus Operations Dispatch System   |
| Dutchess LOOP Bus Vehicles IT Equipment | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment | TO | Dutchess LOOP Bus Dispatch System         |
| Dutchess LOOP Bus Vehicles IT Equipment | TO | Dutchess LOOP Bus Dispatch System         |
| Metro North Rail Vehicles IT Equipment  | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment  | TO | Metro North Rail Operation Control Center |
| Metro North Rail Vehicles IT Equipment  | TO | Metro North Rail Operation Control Center |
| PART Bus Vehicles IT Equipment          | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment          | TO | PART Bus System                           |
| PART Bus Vehicles IT Equipment          | TO | PART Bus System                           |
| Rockland TOR Bus Vehicles IT Equipment  | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment  | TO | Rockland TOR                              |
| Rockland TOR Bus Vehicles IT Equipment  | TO | Rockland TOR                              |

### **Standards**

(AASHTO/ITE/NEMA) TCIP - Control Center (CC) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Onboard (OB) Business Area Standard (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) TCIP - Spatial Representation (SP) Business Area Standard (Data Dictionary, Message Set )

## Architecture Flow

transit work schedule

Transit Management To Transit Maintenance Personnel

### **Inventory**

|   |    |  |
|---|----|--|
| Bee-Line Bus Operations Dispatch System   | TO | Bee-Line Vehicle Maintenance Crew          |
| Dutchess LOOP Bus Dispatch System         | TO | Dutchess LOOP Bus Vehicle Maintenance Crew |
| Metro North Rail Operation Control Center | TO | Metro North Equipment Maintenance Crew     |
| PART Bus System                           | TO | PART Bus Vehicle Maintenance Crew          |
| Rockland TOR                              | TO | Rockland TOR Bus Vehicle Maintenance Crew  |

### **Standards**

None

## Architecture Flow

transportation weather information

Surface Transportation Weather Service To Archived Data Management Subsystem

### **Inventory**

|   |    |                                     |
|---|----|-------------------------------------|
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Traffic Data Archive          |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSP Central Communication/Dispatch |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Traffic Data Archive          |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSP Central Communication/Dispatch |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Traffic Data Archive          |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSP Central Communication/Dispatch |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Traffic Data Archive          |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSP Central Communication/Dispatch |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Traffic Data Archive          |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSP Central Communication/Dispatch |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Freeway Management System     |
| NYSDOT Street Surface Weather Condition Modeling System | TO | HVTMC Traffic Data Archive          |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSDOT Maintenance and Construction |
| NYSDOT Street Surface Weather Condition Modeling System | TO | NYSP Central Communication/Dispatch |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Maintenance and Construction  |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Maintenance Management System |
| NYSTA Street Surface Weather Condition Modeling System  | TO | NYSTA Statewide Operations Center   |

|  |    |   |
|--|----|---|
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                   |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Traffic Data Storage and Retrieval System |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction              |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance Management System             |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center               |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                   |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Traffic Data Storage and Retrieval System |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction              |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance Management System             |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center               |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                   |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Traffic Data Storage and Retrieval System |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction              |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance Management System             |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center               |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                   |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Traffic Data Storage and Retrieval System |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction              |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance Management System             |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center               |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                   |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Traffic Data Storage and Retrieval System |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance and Construction              |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Maintenance Management System             |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Statewide Operations Center               |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Tarrytown Equipment Hub                   |
| NYSTA Street Surface Weather Condition Modeling System | TO | NYSTA Traffic Data Storage and Retrieval System |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

## Architecture Flow

transportation weather information request

Emergency Management To Surface Transportation Weather Service

### **Inventory**

|                                     |    |   |
|-------------------------------------|----|---|
| HVTMC Freeway Management System     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSP Central Communication/Dispatch | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction  | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Statewide Operations Center   | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Tarrytown Equipment Hub       | TO | NYSTA Street Surface Weather Condition Modeling System  |
| HVTMC Freeway Management System     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSP Central Communication/Dispatch | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction  | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Statewide Operations Center   | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Tarrytown Equipment Hub       | TO | NYSTA Street Surface Weather Condition Modeling System  |
| HVTMC Freeway Management System     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSP Central Communication/Dispatch | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction  | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Statewide Operations Center   | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Tarrytown Equipment Hub       | TO | NYSTA Street Surface Weather Condition Modeling System  |
| HVTMC Freeway Management System     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSP Central Communication/Dispatch | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSTA Maintenance and Construction  | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Statewide Operations Center   | TO | NYSTA Street Surface Weather Condition Modeling System  |
| NYSTA Tarrytown Equipment Hub       | TO | NYSTA Street Surface Weather Condition Modeling System  |
| HVTMC Freeway Management System     | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSDOT Maintenance and Construction | TO | NYSDOT Street Surface Weather Condition Modeling System |
| NYSP Central Communication/Dispatch | TO | NYSDOT Street Surface Weather Condition Modeling System |

|                                    |    |  |
|------------------------------------|----|--|
| NYSTA Maintenance and Construction | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Statewide Operations Center  | TO | NYSTA Street Surface Weather Condition Modeling System |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Street Surface Weather Condition Modeling System |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)



## Architecture Flow

travel service info

Yellow Pages Service Providers To Information Service Provider

### **Inventory**

|                                      |    |  |
|--------------------------------------|----|--|
| Tourist Information Provider Systems | TO | HVTMC ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | HVTMC ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | HVTMC ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | HVTMC ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | HVTMC ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSBA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSBA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSBA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSBA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSBA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSBA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSBA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSTA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSTA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSTA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSTA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSTA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | NYSTA ITS Information Service Provider             |
| Tourist Information Provider Systems | TO | Other Privatized ISPs                              |
| Tourist Information Provider Systems | TO | Other Privatized ISPs                              |
| Tourist Information Provider Systems | TO | Other Privatized ISPs                              |
| Tourist Information Provider Systems | TO | Other Privatized ISPs                              |
| Tourist Information Provider Systems | TO | Other Privatized ISPs                              |
| Tourist Information Provider Systems | TO | Other Privatized ISPs                              |
| Tourist Information Provider Systems | TO | SATIN (Service Area Travelers Interactive Network) |
| Tourist Information Provider Systems | TO | SATIN (Service Area Travelers Interactive Network) |
| Tourist Information Provider Systems | TO | SATIN (Service Area Travelers Interactive Network) |
| Tourist Information Provider Systems | TO | SATIN (Service Area Travelers Interactive Network) |
| Tourist Information Provider Systems | TO | SATIN (Service Area Travelers Interactive Network) |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

travel service request

Information Service Provider To Yellow Pages Service Providers

### **Inventory**

|  |    |                                      |
|--|----|--------------------------------------|
| HVTMC ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| HVTMC ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| HVTMC ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| HVTMC ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| HVTMC ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSBA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSBA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSBA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSBA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSBA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSBA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSTA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSTA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSTA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSTA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| NYSTA ITS Information Service Provider             | TO | Tourist Information Provider Systems |
| Other Privatized ISPs                              | TO | Tourist Information Provider Systems |
| Other Privatized ISPs                              | TO | Tourist Information Provider Systems |
| Other Privatized ISPs                              | TO | Tourist Information Provider Systems |
| Other Privatized ISPs                              | TO | Tourist Information Provider Systems |
| Other Privatized ISPs                              | TO | Tourist Information Provider Systems |
| SATIN (Service Area Travelers Interactive Network) | TO | Tourist Information Provider Systems |
| SATIN (Service Area Travelers Interactive Network) | TO | Tourist Information Provider Systems |
| SATIN (Service Area Travelers Interactive Network) | TO | Tourist Information Provider Systems |
| SATIN (Service Area Travelers Interactive Network) | TO | Tourist Information Provider Systems |
| SATIN (Service Area Travelers Interactive Network) | TO | Tourist Information Provider Systems |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

traveler archive data

Information Service Provider To Archived Data Management Subsystem

### **Inventory**

|  |    |                            |
|--|----|----------------------------|
| HVTMC ITS Information Service Provider | TO | HVTMC Traffic Data Archive |
| HVTMC ITS Information Service Provider | TO | HVTMC Traffic Data Archive |
| HVTMC ITS Information Service Provider | TO | HVTMC Traffic Data Archive |
| HVTMC ITS Information Service Provider | TO | HVTMC Traffic Data Archive |
| HVTMC ITS Information Service Provider | TO | HVTMC Traffic Data Archive |
| HVTMC ITS Information Service Provider | TO | HVTMC Traffic Data Archive |
| NYSBA ITS Information Service Provider | TO | NYSBA Toll Archive System  |
| NYSBA ITS Information Service Provider | TO | NYSBA Toll Archive System  |
| NYSBA ITS Information Service Provider | TO | NYSBA Toll Archive System  |
| NYSBA ITS Information Service Provider | TO | NYSBA Toll Archive System  |
| NYSBA ITS Information Service Provider | TO | NYSBA Toll Archive System  |
| NYSBA ITS Information Service Provider | TO | NYSBA Toll Archive System  |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(ASTM) ADMS Data Dictionary Specifications (Data Dictionary)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

traveler information

Information Service Provider To Personal Information Access

### **Inventory**

|  |    |  |
|--|----|--|
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |





|  |                             |
|--|-----------------------------|
| Other Privatized ISPs                              | TO Privatized ISP Interface |
| Other Privatized ISPs                              | TO Privatized ISP Interface |
| Other Privatized ISPs                              | TO Privatized ISP Interface |
| Other Privatized ISPs                              | TO Privatized ISP Interface |
| Other Privatized ISPs                              | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) ISP-Vehicle Location Referencing Standard (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

(SAE) Standard for ATIS Message Sets Delivered Over Bandwidth Restricted Media (Communications Protocol, Data Dictionary, Message Set )

## Architecture Flow

traveler information for media

Information Service Provider To Media

### **Inventory**

|  |    |   |
|--|----|---|
| HVTMC ITS Information Service Provider | TO | Media Traffic and Travel Information System |
| HVTMC ITS Information Service Provider | TO | Media Traffic and Travel Information System |
| HVTMC ITS Information Service Provider | TO | Media Traffic and Travel Information System |
| HVTMC ITS Information Service Provider | TO | Media Traffic and Travel Information System |
| HVTMC ITS Information Service Provider | TO | Media Traffic and Travel Information System |
| NYSTA ITS Information Service Provider | TO | Media Traffic and Travel Information System |
| NYSTA ITS Information Service Provider | TO | Media Traffic and Travel Information System |
| NYSTA ITS Information Service Provider | TO | Media Traffic and Travel Information System |
| NYSTA ITS Information Service Provider | TO | Media Traffic and Travel Information System |
| NYSTA ITS Information Service Provider | TO | Media Traffic and Travel Information System |

### **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

traveler inputs

Traveler To Remote Traveler Support

### **Inventory**

|   |    |  |
|---|----|--|
| Pre-Trip Individual Using Transportation Services | TO | NYSDOT Kiosks                              |
| Pre-Trip Individual Using Transportation Services | TO | NYSTA Service Plaza Kiosks                 |
| Pre-Trip Individual Using Transportation Services | TO | Traveler Cellular and Land-Line Telephones |
| Pre-Trip Individual Using Transportation Services | TO | Traveler PC/Info. Appliance                |

### **Standards**

None



**Architecture Flow**

traveler interface updates

Remote Traveler Support To Traveler

**Inventory**

|  |    |   |
|--|----|---|
| NYSDOT Kiosks                              | TO | Pre-Trip Individual Using Transportation Services |
| NYSTA Service Plaza Kiosks                 | TO | Pre-Trip Individual Using Transportation Services |
| Traveler Cellular and Land-Line Telephones | TO | Pre-Trip Individual Using Transportation Services |
| Traveler PC/Info. Appliance                | TO | Pre-Trip Individual Using Transportation Services |

**Standards**

None

## Architecture Flow

traveler profile

Personal Information Access To Information Service Provider

### **Inventory**

|  |    |  |
|--|----|--|
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |

|  |    |  |
|--|----|--|
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |

**Standards**

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

traveler request

Personal Information Access To Information Service Provider

### **Inventory**

|  |    |  |
|--|----|--|
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |

|  |    |  |
|--|----|--|
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |

|  |    |  |
|--|----|--|
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |

|  |    |  |
|--|----|--|
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) ISP-Vehicle Location Referencing Standard (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

**Architecture Flow**

trip confirmation

Personal Information Access To Information Service Provider

**Inventory**

|  |    |  |
|--|----|--|
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |



|  |    |  |
|--|----|--|
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |

|  |    |  |
|--|----|--|
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |

## **Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

trip plan

Information Service Provider To Personal Information Access

### **Inventory**

|  |    |  |
|--|----|--|
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |





|  |    |                          |
|--|----|--------------------------|
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO | Privatized ISP Interface |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) ISP-Vehicle Location Referencing Standard (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

## Architecture Flow

trip request

Personal Information Access To Information Service Provider

### **Inventory**

|  |    |  |
|--|----|--|
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |



|  |    |  |
|--|----|--|
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |

|  |    |  |
|--|----|--|
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |

|  |    |  |
|--|----|--|
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) ISP-Vehicle Location Referencing Standard (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

**Architecture Flow**

vehicle characteristics

Vehicle Characteristics To Roadway Subsystem

**Inventory**

|   |    |  |
|---|----|--|
| Axle Spacing and Weight of Vehicles on the Road | TO | NYSBA Sensors and CCTV Equipment           |
| Axle Spacing and Weight of Vehicles on the Road | TO | NYSBA Toll Collection Equipment            |
| Axle Spacing and Weight of Vehicles on the Road | TO | NYSTA Electronic Toll Collection Equipment |

**Standards**

None

## Architecture Flow

vehicle location

Vehicle To Transit Vehicle Subsystem

### **Inventory**

|  |    |  |
|--|----|--|
| System That Provides Accurate Position Information | TO | Bee-Line Bus Vehicles IT Equipment           |
| System That Provides Accurate Position Information | TO | Bridge Authority Maintenance Vehicles        |
| System That Provides Accurate Position Information | TO | Local Emergency Vehicles (Fire, EMS, Police) |
| System That Provides Accurate Position Information | TO | Local Road Maintenance Vehicles              |
| System That Provides Accurate Position Information | TO | NYSDOT HELP Trucks                           |
| System That Provides Accurate Position Information | TO | NYSDOT Road Maintenance Vehicles             |
| System That Provides Accurate Position Information | TO | NYSP Vehicles                                |
| System That Provides Accurate Position Information | TO | NYSTA Road Maintenance Vehicles              |
| System That Provides Accurate Position Information | TO | NYSTA Troop T Vehicles                       |
| System That Provides Accurate Position Information | TO | PART Bus Vehicles IT Equipment               |
| System That Provides Accurate Position Information | TO | Rockland TOR Bus Vehicles IT Equipment       |

### **Standards**

None

## Architecture Flow

vehicle probe data

### Roadway Subsystem To Traffic Management

#### **Inventory**

|                                     |    |  |
|-------------------------------------|----|--|
| NYSBA Toll Tag Interface            | TO | TRANSMIT Travel Time System                        |
| NYSBA Toll Tag Interface            | TO | TRANSMIT Travel Time System                        |
| NYSBA Toll Tag Interface            | TO | TRANSMIT Travel Time System                        |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System                    |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System                    |
| NYSDOT Sensors and CCTV Equipment   | TO | HVTMC Freeway Management System                    |
| NYSTA DSRC Receiving Equipment      | TO | NYSTA DSRC Equipment                               |
| NYSTA DSRC Receiving Equipment      | TO | NYSTA DSRC Equipment                               |
| NYSTA DSRC Receiving Equipment      | TO | NYSTA DSRC Equipment                               |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center                  |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center                  |
| NYSTA Sensors and CCTV Equipment    | TO | NYSTA Statewide Operations Center                  |
| NYSTA Toll Tag Interface            | TO | TRANSMIT Travel Time System                        |
| NYSTA Toll Tag Interface            | TO | TRANSMIT Travel Time System                        |
| NYSTA Toll Tag Interface            | TO | TRANSMIT Travel Time System                        |
| Privatized ISP Interface            | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface            | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface            | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface            | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface            | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface            | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface            | TO | Other Privatized ISPs                              |
| Privatized ISP Interface            | TO | Other Privatized ISPs                              |
| Privatized ISP Interface            | TO | Other Privatized ISPs                              |
| Privatized ISP Interface            | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface            | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface            | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center             |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center             |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center             |
| TRANSMIT Probe Interface            | TO | TRANSMIT Travel Time System                        |
| TRANSMIT Probe Interface            | TO | TRANSMIT Travel Time System                        |
| TRANSMIT Probe Interface            | TO | TRANSMIT Travel Time System                        |
| TRANSMIT Travel Time System         | TO | TRANSCOM Operations Information Center             |
| TRANSMIT Travel Time System         | TO | TRANSCOM Operations Information Center             |
| TRANSMIT Travel Time System         | TO | TRANSCOM Operations Information Center             |
| NYSBA Toll Tag Interface            | TO | TRANSMIT Travel Time System                        |
| NYSBA Toll Tag Interface            | TO | TRANSMIT Travel Time System                        |
| NYSBA Toll Tag Interface            | TO | TRANSMIT Travel Time System                        |
| NYSBA Toll Tag Interface            | TO | TRANSMIT Travel Time System                        |
| NYSBA Toll Tag Interface            | TO | TRANSMIT Travel Time System                        |
| NYSBA Toll Tag Interface            | TO | TRANSMIT Travel Time System                        |
| NYSBA Toll Tag Interface            | TO | TRANSMIT Travel Time System                        |
| NYSBA Toll Tag Interface            | TO | TRANSMIT Travel Time System                        |

|                                   |   |
|-----------------------------------|---|
| NYSBA Toll Tag Interface          | TO TRANSMIT Travel Time System            |
| NYSBA Toll Tag Interface          | TO TRANSMIT Travel Time System            |
| NYSBA Toll Tag Interface          | TO TRANSMIT Travel Time System            |
| NYSDOT Sensors and CCTV Equipment | TO HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment | TO HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment | TO HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment | TO HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment | TO HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment | TO HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment | TO HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment | TO HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment | TO HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment | TO HVTMC Freeway Management System        |
| NYSDOT Sensors and CCTV Equipment | TO HVTMC Freeway Management System        |
| NYSTA DSRC Receiving Equipment    | TO NYSTA DSRC Equipment                   |
| NYSTA DSRC Receiving Equipment    | TO NYSTA DSRC Equipment                   |
| NYSTA DSRC Receiving Equipment    | TO NYSTA DSRC Equipment                   |
| NYSTA DSRC Receiving Equipment    | TO NYSTA DSRC Equipment                   |
| NYSTA DSRC Receiving Equipment    | TO NYSTA DSRC Equipment                   |
| NYSTA DSRC Receiving Equipment    | TO NYSTA DSRC Equipment                   |
| NYSTA DSRC Receiving Equipment    | TO NYSTA DSRC Equipment                   |
| NYSTA DSRC Receiving Equipment    | TO NYSTA DSRC Equipment                   |
| NYSTA DSRC Receiving Equipment    | TO NYSTA DSRC Equipment                   |
| NYSTA DSRC Receiving Equipment    | TO NYSTA DSRC Equipment                   |
| NYSTA DSRC Receiving Equipment    | TO NYSTA DSRC Equipment                   |
| NYSTA DSRC Receiving Equipment    | TO NYSTA DSRC Equipment                   |
| NYSTA DSRC Receiving Equipment    | TO NYSTA DSRC Equipment                   |
| NYSTA DSRC Receiving Equipment    | TO NYSTA DSRC Equipment                   |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Statewide Operations Center      |
| NYSTA Sensors and CCTV Equipment  | TO NYSTA Statewide Operations Center      |
| NYSTA Toll Tag Interface          | TO TRANSMIT Travel Time System            |
| NYSTA Toll Tag Interface          | TO TRANSMIT Travel Time System            |
| NYSTA Toll Tag Interface          | TO TRANSMIT Travel Time System            |
| NYSTA Toll Tag Interface          | TO TRANSMIT Travel Time System            |
| NYSTA Toll Tag Interface          | TO TRANSMIT Travel Time System            |
| NYSTA Toll Tag Interface          | TO TRANSMIT Travel Time System            |
| NYSTA Toll Tag Interface          | TO TRANSMIT Travel Time System            |
| NYSTA Toll Tag Interface          | TO TRANSMIT Travel Time System            |
| NYSTA Toll Tag Interface          | TO TRANSMIT Travel Time System            |
| NYSTA Toll Tag Interface          | TO TRANSMIT Travel Time System            |
| NYSTA Toll Tag Interface          | TO TRANSMIT Travel Time System            |
| Privatized ISP Interface          | TO HVTMC ITS Information Service Provider |
| Privatized ISP Interface          | TO HVTMC ITS Information Service Provider |
| Privatized ISP Interface          | TO HVTMC ITS Information Service Provider |
| Privatized ISP Interface          | TO HVTMC ITS Information Service Provider |

|                                     |    |  |
|-------------------------------------|----|--|
| Privatized ISP Interface            | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface            | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface            | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface            | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface            | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface            | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface            | TO | Other Privatized ISPs                              |
| Privatized ISP Interface            | TO | Other Privatized ISPs                              |
| Privatized ISP Interface            | TO | Other Privatized ISPs                              |
| Privatized ISP Interface            | TO | Other Privatized ISPs                              |
| Privatized ISP Interface            | TO | Other Privatized ISPs                              |
| Privatized ISP Interface            | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface            | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface            | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface            | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface            | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface            | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface            | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface            | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface            | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface            | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface            | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface            | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface            | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface            | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface            | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface            | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface            | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface            | TO | Other Privatized ISPs                              |
| Privatized ISP Interface            | TO | Other Privatized ISPs                              |
| Privatized ISP Interface            | TO | Other Privatized ISPs                              |
| Privatized ISP Interface            | TO | Other Privatized ISPs                              |
| Privatized ISP Interface            | TO | Other Privatized ISPs                              |
| Privatized ISP Interface            | TO | Other Privatized ISPs                              |
| Privatized ISP Interface            | TO | Other Privatized ISPs                              |
| Privatized ISP Interface            | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface            | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface            | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface            | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface            | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface            | TO | SATIN (Service Area Travelers Interactive Network) |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center             |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center             |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center             |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center             |

|                                     |    |  |
|-------------------------------------|----|--|
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSCOM Sensors and CCTV Equipment | TO | TRANSCOM Operations Information Center |
| TRANSMIT Probe Interface            | TO | TRANSMIT Travel Time System            |
| TRANSMIT Probe Interface            | TO | TRANSMIT Travel Time System            |
| TRANSMIT Probe Interface            | TO | TRANSMIT Travel Time System            |
| TRANSMIT Probe Interface            | TO | TRANSMIT Travel Time System            |
| TRANSMIT Probe Interface            | TO | TRANSMIT Travel Time System            |
| TRANSMIT Probe Interface            | TO | TRANSMIT Travel Time System            |
| TRANSMIT Probe Interface            | TO | TRANSMIT Travel Time System            |
| TRANSMIT Probe Interface            | TO | TRANSMIT Travel Time System            |
| TRANSMIT Probe Interface            | TO | TRANSMIT Travel Time System            |
| TRANSMIT Probe Interface            | TO | TRANSMIT Travel Time System            |
| TRANSMIT Travel Time System         | TO | TRANSCOM Operations Information Center |
| TRANSMIT Travel Time System         | TO | TRANSCOM Operations Information Center |
| TRANSMIT Travel Time System         | TO | TRANSCOM Operations Information Center |
| TRANSMIT Travel Time System         | TO | TRANSCOM Operations Information Center |
| TRANSMIT Travel Time System         | TO | TRANSCOM Operations Information Center |
| TRANSMIT Travel Time System         | TO | TRANSCOM Operations Information Center |
| TRANSMIT Travel Time System         | TO | TRANSCOM Operations Information Center |
| TRANSMIT Travel Time System         | TO | TRANSCOM Operations Information Center |
| TRANSMIT Travel Time System         | TO | TRANSCOM Operations Information Center |
| TRANSMIT Travel Time System         | TO | TRANSCOM Operations Information Center |
| TRANSMIT Travel Time System         | TO | TRANSCOM Operations Information Center |



## Standards

- (AASHTO/ITE/NEMA) Data Collection & Monitoring Devices (Data Dictionary, Message Set )
- (AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )
- (AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)
- (ASTM) Specification for Dedicated Short Range Communication (DSRC) Data Link Layer: Medium Access and Logical Link Control (Communications Protocol)
- (ASTM) Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz (Communications Protocol)
- (ASTM) Standard Specification for 5.9 GHz Data Link Layer (Communications Protocol)
- (ASTM) Standard Specification for 5.9 GHz Physical Layer (Communications Protocol)
- (IEEE) Security/Privacy of Vehicle/RS Communications including Smart Card Communications ( )
- (IEEE) Standard for Message Sets for Vehicle/Roadside Communications (Data Dictionary, Message Set )
- (SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)
- (SAE) ISP-Vehicle Location Referencing Standard (Data Dictionary)
- (SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )
- (SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )
- (SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

**Architecture Flow**

vehicle signage data

Maintenance and Construction Vehicle To Vehicle

**Inventory**

|                             |    |                                |
|-----------------------------|----|--------------------------------|
| NYSTA DSRC Equipment        | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment        | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment        | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment        | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment        | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment        | TO | NYSTA DSRC Receiving Equipment |
| TRANSMIT Travel Time System | TO | NYSBA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSBA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSBA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSBA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSBA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSBA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSBA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSTA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSTA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSTA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSTA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSTA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSTA Toll Tag Interface       |
| NYSTA DSRC Equipment        | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment        | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment        | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment        | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment        | TO | NYSTA DSRC Receiving Equipment |
| NYSTA DSRC Equipment        | TO | NYSTA DSRC Receiving Equipment |
| TRANSMIT Travel Time System | TO | NYSBA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSBA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSBA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSBA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSBA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSBA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSTA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSTA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSTA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSTA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSTA Toll Tag Interface       |
| TRANSMIT Travel Time System | TO | NYSTA Toll Tag Interface       |

## **Standards**

(ASTM) Specification for Dedicated Short Range Communication (DSRC) Data Link Layer: Medium Access and Logical Link Control (Communications Protocol)

(ASTM) Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz (Communications Protocol)

(ASTM) Standard Specification for 5.9 GHz Data Link Layer (Communications Protocol)

(ASTM) Standard Specification for 5.9 GHz Physical Layer (Communications Protocol)

(IEEE) Security/Privacy of Vehicle/RS Communications including Smart Card Communications ( )

(IEEE) Standard for Message Sets for Vehicle/Roadside Communications (Data Dictionary, Message Set )

## Architecture Flow

video surveillance control

### Maintenance and Construction Management To Roadway Subsystem

#### **Inventory**

|  |    |                                     |
|--|----|-------------------------------------|
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| NYSBA Maintenance and Construction     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Maintenance and Construction     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Maintenance and Construction     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Maintenance and Construction     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSTA Maintenance and Construction     | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Maintenance and Construction     | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Maintenance and Construction     | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Maintenance and Construction     | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| HVTMC Freeway Management System        | TO | NYSDOT Sensors and CCTV Equipment   |
| NYSBA Maintenance and Construction     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Maintenance and Construction     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Maintenance and Construction     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Maintenance and Construction     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Operations Center                | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |

|  |    |                                     |
|--|----|-------------------------------------|
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSBA Satellite Operations Centers     | TO | NYSBA Sensors and CCTV Equipment    |
| NYSTA Maintenance and Construction     | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Maintenance and Construction     | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Maintenance and Construction     | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Maintenance and Construction     | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Statewide Operations Center      | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| NYSTA Tarrytown Equipment Hub          | TO | NYSTA Sensors and CCTV Equipment    |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |
| TRANSCOM Operations Information Center | TO | TRANSCOM Sensors and CCTV Equipment |

**Standards**

(AASHTO/ITE/NEMA) Data Dictionary for Closed Circuit Television (CCTV) (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) Global Object Definitions (Data Dictionary, Message Set )

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

(AASHTO/ITE/NEMA) Object Definitions for Video Switches (Data Dictionary, Message Set )

## Architecture Flow

weather information

Weather Service To Archived Data Management Subsystem

### **Inventory**

|                              |    |   |
|------------------------------|----|---|
| Weather Network Subscription | TO | Bee-Line Bus Operations Dispatch System   |
| Weather Network Subscription | TO | Dutchess LOOP Bus Dispatch System         |
| Weather Network Subscription | TO | HVTMC Freeway Management System           |
| Weather Network Subscription | TO | HVTMC ITS Information Service Provider    |
| Weather Network Subscription | TO | Local Emergency Dispatch                  |
| Weather Network Subscription | TO | Local Maintenance and Construction        |
| Weather Network Subscription | TO | Metro North Rail Operation Control Center |
| Weather Network Subscription | TO | NYSBA Maintenance and Construction        |
| Weather Network Subscription | TO | NYSBA Operations Center                   |
| Weather Network Subscription | TO | NYSDOT Maintenance and Construction       |
| Weather Network Subscription | TO | NYSP Central Communication/Dispatch       |
| Weather Network Subscription | TO | NYSTA ITS Information Service Provider    |
| Weather Network Subscription | TO | NYSTA Maintenance and Construction        |
| Weather Network Subscription | TO | NYSTA Statewide Operations Center         |
| Weather Network Subscription | TO | PART Bus System                           |
| Weather Network Subscription | TO | Rockland TOR                              |
| Weather Network Subscription | TO | TRANSCOM Operations Information Center    |
| Weather Network Subscription | TO | Bee-Line Bus Operations Dispatch System   |
| Weather Network Subscription | TO | Dutchess LOOP Bus Dispatch System         |
| Weather Network Subscription | TO | HVTMC Freeway Management System           |
| Weather Network Subscription | TO | HVTMC ITS Information Service Provider    |
| Weather Network Subscription | TO | Local Emergency Dispatch                  |
| Weather Network Subscription | TO | Local Maintenance and Construction        |
| Weather Network Subscription | TO | Metro North Rail Operation Control Center |
| Weather Network Subscription | TO | NYSBA Maintenance and Construction        |
| Weather Network Subscription | TO | NYSBA Operations Center                   |
| Weather Network Subscription | TO | NYSDOT Maintenance and Construction       |
| Weather Network Subscription | TO | NYSP Central Communication/Dispatch       |
| Weather Network Subscription | TO | NYSTA ITS Information Service Provider    |
| Weather Network Subscription | TO | NYSTA Maintenance and Construction        |
| Weather Network Subscription | TO | NYSTA Statewide Operations Center         |
| Weather Network Subscription | TO | PART Bus System                           |
| Weather Network Subscription | TO | Rockland TOR                              |
| Weather Network Subscription | TO | TRANSCOM Operations Information Center    |
| Weather Network Subscription | TO | Bee-Line Bus Operations Dispatch System   |
| Weather Network Subscription | TO | Dutchess LOOP Bus Dispatch System         |
| Weather Network Subscription | TO | HVTMC Freeway Management System           |
| Weather Network Subscription | TO | HVTMC ITS Information Service Provider    |
| Weather Network Subscription | TO | Local Emergency Dispatch                  |
| Weather Network Subscription | TO | Local Maintenance and Construction        |
| Weather Network Subscription | TO | Metro North Rail Operation Control Center |
| Weather Network Subscription | TO | NYSBA Maintenance and Construction        |
| Weather Network Subscription | TO | NYSBA Operations Center                   |
| Weather Network Subscription | TO | NYSDOT Maintenance and Construction       |
| Weather Network Subscription | TO | NYSP Central Communication/Dispatch       |
| Weather Network Subscription | TO | NYSTA ITS Information Service Provider    |

|                              |  |
|------------------------------|--|
| Weather Network Subscription | TO NYSTA Maintenance and Construction        |
| Weather Network Subscription | TO NYSTA Statewide Operations Center         |
| Weather Network Subscription | TO PART Bus System                           |
| Weather Network Subscription | TO Rockland TOR                              |
| Weather Network Subscription | TO TRANSCOM Operations Information Center    |
| Weather Network Subscription | TO Bee-Line Bus Operations Dispatch System   |
| Weather Network Subscription | TO Dutchess LOOP Bus Dispatch System         |
| Weather Network Subscription | TO HVTMC Freeway Management System           |
| Weather Network Subscription | TO HVTMC ITS Information Service Provider    |
| Weather Network Subscription | TO Local Emergency Dispatch                  |
| Weather Network Subscription | TO Local Maintenance and Construction        |
| Weather Network Subscription | TO Metro North Rail Operation Control Center |
| Weather Network Subscription | TO NYSBA Maintenance and Construction        |
| Weather Network Subscription | TO NYSBA Operations Center                   |
| Weather Network Subscription | TO NYSDOT Maintenance and Construction       |
| Weather Network Subscription | TO NYSP Central Communication/Dispatch       |
| Weather Network Subscription | TO NYSTA ITS Information Service Provider    |
| Weather Network Subscription | TO NYSTA Maintenance and Construction        |
| Weather Network Subscription | TO NYSTA Statewide Operations Center         |
| Weather Network Subscription | TO PART Bus System                           |
| Weather Network Subscription | TO Rockland TOR                              |
| Weather Network Subscription | TO TRANSCOM Operations Information Center    |
| Weather Network Subscription | TO Bee-Line Bus Operations Dispatch System   |
| Weather Network Subscription | TO Dutchess LOOP Bus Dispatch System         |
| Weather Network Subscription | TO HVTMC Freeway Management System           |
| Weather Network Subscription | TO HVTMC ITS Information Service Provider    |
| Weather Network Subscription | TO Local Emergency Dispatch                  |
| Weather Network Subscription | TO Local Maintenance and Construction        |
| Weather Network Subscription | TO Metro North Rail Operation Control Center |
| Weather Network Subscription | TO NYSBA Maintenance and Construction        |
| Weather Network Subscription | TO NYSBA Operations Center                   |
| Weather Network Subscription | TO NYSDOT Maintenance and Construction       |
| Weather Network Subscription | TO NYSP Central Communication/Dispatch       |
| Weather Network Subscription | TO NYSTA ITS Information Service Provider    |
| Weather Network Subscription | TO NYSTA Maintenance and Construction        |
| Weather Network Subscription | TO NYSTA Statewide Operations Center         |
| Weather Network Subscription | TO PART Bus System                           |
| Weather Network Subscription | TO Rockland TOR                              |
| Weather Network Subscription | TO TRANSCOM Operations Information Center    |
| Weather Network Subscription | TO Bee-Line Bus Operations Dispatch System   |
| Weather Network Subscription | TO Dutchess LOOP Bus Dispatch System         |
| Weather Network Subscription | TO HVTMC Freeway Management System           |
| Weather Network Subscription | TO HVTMC ITS Information Service Provider    |
| Weather Network Subscription | TO Local Emergency Dispatch                  |
| Weather Network Subscription | TO Local Maintenance and Construction        |
| Weather Network Subscription | TO Metro North Rail Operation Control Center |
| Weather Network Subscription | TO NYSBA Maintenance and Construction        |
| Weather Network Subscription | TO NYSBA Operations Center                   |
| Weather Network Subscription | TO NYSDOT Maintenance and Construction       |
| Weather Network Subscription | TO NYSP Central Communication/Dispatch       |
| Weather Network Subscription | TO NYSTA ITS Information Service Provider    |

|                              |    |  |
|------------------------------|----|--|
| Weather Network Subscription | TO | NYSTA Maintenance and Construction     |
| Weather Network Subscription | TO | NYSTA Statewide Operations Center      |
| Weather Network Subscription | TO | PART Bus System                        |
| Weather Network Subscription | TO | Rockland TOR                           |
| Weather Network Subscription | TO | TRANSCOM Operations Information Center |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

work plan feedback

Emergency Management To Maintenance and Construction Management

**Inventory**

|                                    |    |                                     |
|------------------------------------|----|-------------------------------------|
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| NYSBA Operations Center            | TO | NYSBA Maintenance and Construction  |
| NYSBA Satellite Operations Centers | TO | NYSBA Maintenance and Construction  |
| NYSTA Statewide Operations Center  | TO | NYSTA Maintenance and Construction  |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| NYSBA Operations Center            | TO | NYSBA Maintenance and Construction  |
| NYSBA Satellite Operations Centers | TO | NYSBA Maintenance and Construction  |
| NYSTA Statewide Operations Center  | TO | NYSTA Maintenance and Construction  |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| NYSBA Operations Center            | TO | NYSBA Maintenance and Construction  |
| NYSBA Satellite Operations Centers | TO | NYSBA Maintenance and Construction  |
| NYSTA Statewide Operations Center  | TO | NYSTA Maintenance and Construction  |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| NYSBA Operations Center            | TO | NYSBA Maintenance and Construction  |
| NYSBA Satellite Operations Centers | TO | NYSBA Maintenance and Construction  |
| NYSTA Statewide Operations Center  | TO | NYSTA Maintenance and Construction  |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | Local Maintenance and Construction  |
| HVTMC Freeway Management System    | TO | NYSDOT Maintenance and Construction |
| NYSBA Operations Center            | TO | NYSBA Maintenance and Construction  |
| NYSBA Satellite Operations Centers | TO | NYSBA Maintenance and Construction  |
| NYSTA Statewide Operations Center  | TO | NYSTA Maintenance and Construction  |
| NYSTA Tarrytown Equipment Hub      | TO | NYSTA Maintenance and Construction  |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)





|                                     |    |   |
|-------------------------------------|----|---|
| NYSDOT Maintenance and Construction | TO | HVTMC ITS Information Service Provider      |
| NYSDOT Maintenance and Construction | TO | Media Traffic and Travel Information System |
| NYSDOT Maintenance and Construction | TO | HVTMC Freeway Management System             |
| NYSDOT Maintenance and Construction | TO | HVTMC ITS Information Service Provider      |
| NYSDOT Maintenance and Construction | TO | Media Traffic and Travel Information System |
| NYSDOT Maintenance and Construction | TO | HVTMC Freeway Management System             |
| NYSDOT Maintenance and Construction | TO | HVTMC ITS Information Service Provider      |
| NYSDOT Maintenance and Construction | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | NYSTA ITS Information Service Provider      |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center           |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub               |
| NYSTA Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | NYSTA ITS Information Service Provider      |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center           |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub               |
| NYSTA Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | NYSTA ITS Information Service Provider      |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center           |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub               |
| NYSTA Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | NYSTA ITS Information Service Provider      |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center           |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub               |
| NYSTA Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | NYSTA ITS Information Service Provider      |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center           |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub               |
| NYSTA Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | NYSTA ITS Information Service Provider      |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center           |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub               |
| Local Maintenance and Construction  | TO | HVTMC Freeway Management System             |
| Local Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSBA Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSBA Maintenance and Construction  | TO | NYSBA ITS Information Service Provider      |
| NYSBA Maintenance and Construction  | TO | NYSBA Operations Center                     |
| NYSBA Maintenance and Construction  | TO | NYSBA Satellite Operations Centers          |
| NYSDOT Maintenance and Construction | TO | HVTMC Freeway Management System             |
| NYSDOT Maintenance and Construction | TO | HVTMC ITS Information Service Provider      |
| NYSDOT Maintenance and Construction | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | Media Traffic and Travel Information System |
| NYSTA Maintenance and Construction  | TO | NYSTA ITS Information Service Provider      |
| NYSTA Maintenance and Construction  | TO | NYSTA Statewide Operations Center           |
| NYSTA Maintenance and Construction  | TO | NYSTA Tarrytown Equipment Hub               |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

**Architecture Flow**

work zone status

Maintenance and Construction Vehicle To Maintenance and Construction Management

**Inventory**

|                                       |    |                                     |
|---------------------------------------|----|-------------------------------------|
| Bridge Authority Maintenance Vehicles | TO | NYSBA Maintenance and Construction  |
| Local Road Maintenance Vehicles       | TO | Local Maintenance and Construction  |
| NYSDOT Road Maintenance Vehicles      | TO | NYSDOT Maintenance and Construction |
| NYSTA Road Maintenance Vehicles       | TO | NYSTA Maintenance and Construction  |

**Standards**

None

**Architecture Flow**

work zone warning

Maintenance and Construction Vehicle To Maintenance and Construction Field Personnel

**Inventory**

|                                       |    |                                    |
|---------------------------------------|----|------------------------------------|
| Bridge Authority Maintenance Vehicles | TO | NYSBA Maintenance Field Personnel  |
| Local Road Maintenance Vehicles       | TO | Local Maintenance Field Personnel  |
| NYSBA Sensors and CCTV Equipment      | TO | NYSBA Maintenance Field Personnel  |
| NYSDOT Road Maintenance Vehicles      | TO | NYSDOT Maintenance Field Personnel |
| NYSDOT Sensors and CCTV Equipment     | TO | NYSDOT Maintenance Field Personnel |
| NYSTA DSRC Equipment                  | TO | NYSTA Maintenance Field Personnel  |
| NYSTA Road Maintenance Vehicles       | TO | NYSTA Maintenance Field Personnel  |
| NYSTA Sensors and CCTV Equipment      | TO | NYSTA Maintenance Field Personnel  |

**Standards**

None

**Architecture Flow**

work zone warning device control

Maintenance and Construction Management To Roadway Subsystem

**Inventory**

|                                    |    |                                  |
|------------------------------------|----|----------------------------------|
| NYSBA Maintenance and Construction | TO | NYSBA Sensors and CCTV Equipment |
| NYSTA Maintenance and Construction | TO | NYSTA DSRC Equipment             |
| NYSTA Maintenance and Construction | TO | NYSTA Sensors and CCTV Equipment |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

**Architecture Flow**

work zone warning status

Roadway Subsystem To Maintenance and Construction Management

**Inventory**

|                                       |    |                                     |
|---------------------------------------|----|-------------------------------------|
| Bridge Authority Maintenance Vehicles | TO | NYSBA Maintenance and Construction  |
| Local Road Maintenance Vehicles       | TO | Local Maintenance and Construction  |
| NYSBA Sensors and CCTV Equipment      | TO | NYSBA Maintenance and Construction  |
| NYSDOT Road Maintenance Vehicles      | TO | NYSDOT Maintenance and Construction |
| NYSTA DSRC Equipment                  | TO | NYSTA Maintenance and Construction  |
| NYSTA Road Maintenance Vehicles       | TO | NYSTA Maintenance and Construction  |
| NYSTA Sensors and CCTV Equipment      | TO | NYSTA Maintenance and Construction  |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Field Standards Group (Communications Protocol)

## Architecture Flow

yellow pages information

Information Service Provider To Personal Information Access

### **Inventory**

|  |    |  |
|--|----|--|
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Privatized ISP Interface                   |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler Cellular and Land-Line Telephones |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | Traveler PC/Info. Appliance                |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |
| HVTMC ITS Information Service Provider | TO | NYSDOT Kiosks                              |





|  |                             |
|--|-----------------------------|
| Other Privatized ISPs                              | TO Privatized ISP Interface |
| Other Privatized ISPs                              | TO Privatized ISP Interface |
| Other Privatized ISPs                              | TO Privatized ISP Interface |
| Other Privatized ISPs                              | TO Privatized ISP Interface |
| Other Privatized ISPs                              | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |
| SATIN (Service Area Travelers Interactive Network) | TO Privatized ISP Interface |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) ISP-Vehicle Location Referencing Standard (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

(SAE) Standard for ATIS Message Sets Delivered Over Bandwidth Restricted Media (Communications Protocol, Data Dictionary, Message Set )



## Architecture Flow

yellow pages request

Personal Information Access To Information Service Provider

### **Inventory**

|  |    |  |
|--|----|--|
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |

|  |    |  |
|--|----|--|
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |

|  |    |  |
|--|----|--|
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSDOT Kiosks                              | TO | HVTMC ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| NYSTA Service Plaza Kiosks                 | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | HVTMC ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | NYSTA ITS Information Service Provider             |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | Other Privatized ISPs                              |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Privatized ISP Interface                   | TO | SATIN (Service Area Travelers Interactive Network) |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | HVTMC ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider             |

|  |    |  |
|--|----|--|
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider |
| Traveler Cellular and Land-Line Telephones | TO | NYSTA ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | HVTMC ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider |
| Traveler PC/Info. Appliance                | TO | NYSTA ITS Information Service Provider |

**Standards**

(AASHTO/ITE/NEMA) NTCIP Center-to-Center Standards Group (Communications Protocol)

(SAE) Data Dictionary for Advanced Traveler Information System (ATIS) (Data Dictionary)

(SAE) ISP-Vehicle Location Referencing Standard (Data Dictionary)

(SAE) Message Set for Advanced Traveler Information System (ATIS) (Message Set )

(SAE) Messages for Handling Strings and Look-Up Tables in ATIS Standards (Message Set )

(SAE) Rules for Standardizing Street Names and Route IDs (Message Set )

**APPENDIX D**  
**RELEVANT MARKET PACKAGE REFERENCE DIAGRAMS**

## OVERVIEW OF MARKET PACKAGES REFERENCE SECTION

To provide visibility into the service options that will be considered by ITS implementers, the National ITS Architecture Program has defined a set of Market Packages that are tailored to fit – separately or in combination – real world transportation problems and needs. As illustrated in Figure 1, this is structured around more than sixty of these packages that illustrate the range of incremental deployment options that may apply to different scenarios and time frames. In short, the market packages address specific services that might be required by traffic managers, transit operators, travelers, and other ITS stakeholders.

The market packages represent the “building blocks” that can be deployed over time to efficiently achieve high-end ITS services. Unlike what the ITS world once called “User Services”, several different market packages are defined for each major application area in order to provide a palette of services at varying cost. Market packages are also identified to segregate services, which are likely to encounter technical or non-technical challenges from lower risk services. This approach yields market packages that may be deployed early with lower risk.

For example, the route guidance series of market packages begins with the Autonomous Route Guidance package, which provides a self-contained route guidance service. Initial infrastructure support is provided by a second incremental Dynamic Route Guidance market package, which adds the capability to broadcast real-time updates from the infrastructure to the mobile route guidance equipment. The third market package, Information Service Provider (ISP)-Based Route Guidance, supports direct provision of route plans from the infrastructure. This market package can reduce the cost of in-vehicle equipment since it removes the requirement for route plan calculation from the vehicle. It also enables more explicit infrastructure control of the route selection process, which has the potential to enhance network performance. Building on this latter potential, the most advanced route guidance market package tightly integrates the centralized route planning capability with area-wide traffic control for further enhancements in overall system performance.

| - - - - - MARKET PACKAGES - - - - -   |  |  |
|---|--|--|
| <p><b>ARCHIVED DATA MANAGEMENT</b></p> <ul style="list-style-type: none"> <li>• ITS Data Mart</li> <li>• ITS Data Warehouse</li> <li>• ITS Virtual Data Warehouse</li> </ul> <p><b>TRAFFIC MANAGEMENT</b></p> <ul style="list-style-type: none"> <li>• Network Surveillance</li> <li>• Probe Surveillance</li> <li>• Surface Street Control</li> <li>• Freeway Control</li> <li>• HOV Lane Management</li> <li>• Traffic Information Dissemination</li> <li>• Regional Traffic Control</li> <li>• Incident Management System</li> <li>• Traffic Forecast and Demand Management</li> <li>• Electronic Toll Collection</li> <li>• Emissions Monitoring and Management</li> <li>• Virtual TMC and Smart Probe Data</li> <li>• Standard Railroad Grade Crossing</li> <li>• Advanced Railroad Grade Crossing</li> <li>• Railroad Operations Coordination</li> <li>• Parking Facility Management</li> <li>• Regional Parking Management</li> <li>• Reversible Lane Management</li> <li>• Speed Monitoring</li> <li>• Drawbridge Management</li> </ul> <p><b>EMERGENCY MANAGEMENT</b></p> <ul style="list-style-type: none"> <li>• Emergency Response</li> <li>• Emergency Routing</li> <li>• Mayday Support</li> <li>• Roadway Service Patrols</li> </ul> | <p><b>TRAVELER INFORMATION</b></p> <ul style="list-style-type: none"> <li>• Broadcast Traveler Information</li> <li>• Interactive Traveler Information</li> <li>• Autonomous Route Guidance</li> <li>• Dynamic Route Guidance</li> <li>• Information Service Provider (ISP) - Based Route Guidance</li> <li>• Integrated Transportation Management/Route Guidance</li> <li>• Yellow Pages and Reservations</li> <li>• Dynamic Ridesharing</li> <li>• In Vehicle Signing</li> </ul> <p><b>COMMERCIAL VEHICLE OPERATIONS</b></p> <ul style="list-style-type: none"> <li>• Fleet Administration</li> <li>• Freight Administration</li> <li>• Electronic Clearance</li> <li>• CV Administration Processes</li> <li>• Intl. Border Electronic Clearance</li> <li>• Weigh-In-Motion</li> <li>• Roadside CVO Safety</li> <li>• On-board CVO Safety</li> <li>• CVO Fleet Maintenance</li> <li>• HAZMAT Management</li> </ul> <p><b>PUBLIC TRANSPORTATION</b></p> <ul style="list-style-type: none"> <li>• Transit Vehicle Tracking</li> <li>• Transit Fixed-Route Operations</li> <li>• Demand Response Transit Ops.</li> <li>• Transit Passenger &amp; Fare Mgmt.</li> <li>• Transit Security</li> <li>• Transit Maintenance</li> <li>• Multi-modal Coordination</li> <li>• Transit Traveler Information</li> </ul> | <p><b>VEHICLE SAFETY</b></p> <ul style="list-style-type: none"> <li>• Vehicle Safety Monitoring</li> <li>• Driver Safety Monitoring</li> <li>• Longitudinal Safety Warning</li> <li>• Lateral Safety Warning</li> <li>• Intersection Safety Warning</li> <li>• Pre-Crash Safety Warning</li> <li>• Driver Visibility Improvement</li> <li>• Advanced Vehicle. Longitudinal Control</li> <li>• Advanced Vehicle Lateral Control</li> <li>• Intersection Collision Avoidance</li> <li>• Automated Highway System</li> </ul> <p><b>MAINTENANCE &amp; CONSTRUCTION MANAGEMENT</b></p> <ul style="list-style-type: none"> <li>• Maintenance and Construction Vehicle Tracking</li> <li>• Maintenance and Construction Vehicle Maintenance</li> <li>• Road Weather Data Collection</li> <li>• Weather Information Processing and Distribution</li> <li>• Roadway Automated Treatment</li> <li>• Winter Maintenance</li> <li>• Roadway Maintenance and Construction</li> <li>• Work Zone Management</li> <li>• Work Zone Safety Monitoring</li> <li>• Maintenance and Construction Activity Coordination</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Note:</b> Highlighted Market Packages represent selected Market Packages for the Region</p> </div> |

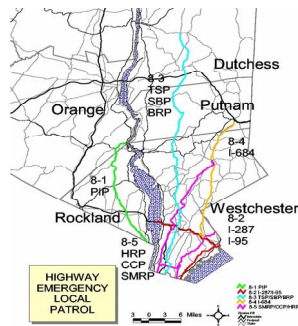
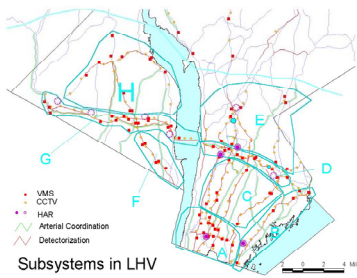
**Figure 1. Defined “Market Packages” As Per the National ITS Architecture Program**

Accordingly, questions such as the example: “Once I implement electronic toll collection in my region, what other services can I implement by extending the beacon infrastructure?”, and “What sorts of efficiencies are possible when advanced traveler information and traffic management systems are implemented in the same region?” are readily answered via the National ITS Architecture.

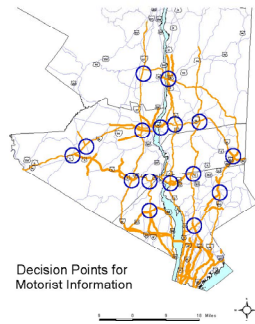
The following sections describe each of the 44 Market Packages that have been identified as having potential relevance for implementation in the region. For clarity, the packages are grouped into seven “bundles” of related and “building block”-based functionality. Please note that no section is provided for the National ITS Architecture Program bundle “Vehicle Safety” as these packages either represent items that are heavily reliant on in-vehicle devices likely to be offered initially by auto manufacturers and/or are based on immature technologies associated with “Automated Highways” initiatives. Additionally, the definitions of Market Packages not on the Delphi survey can be found at <http://www.iteris.com/itsarch/> under Market Packages.



# ARCHIVED DATA MANAGEMENT (ADM)



# ARCHIVE DATA MANAGEMENT



## ITS DATA MART (AD1)

### *Synopsis:*

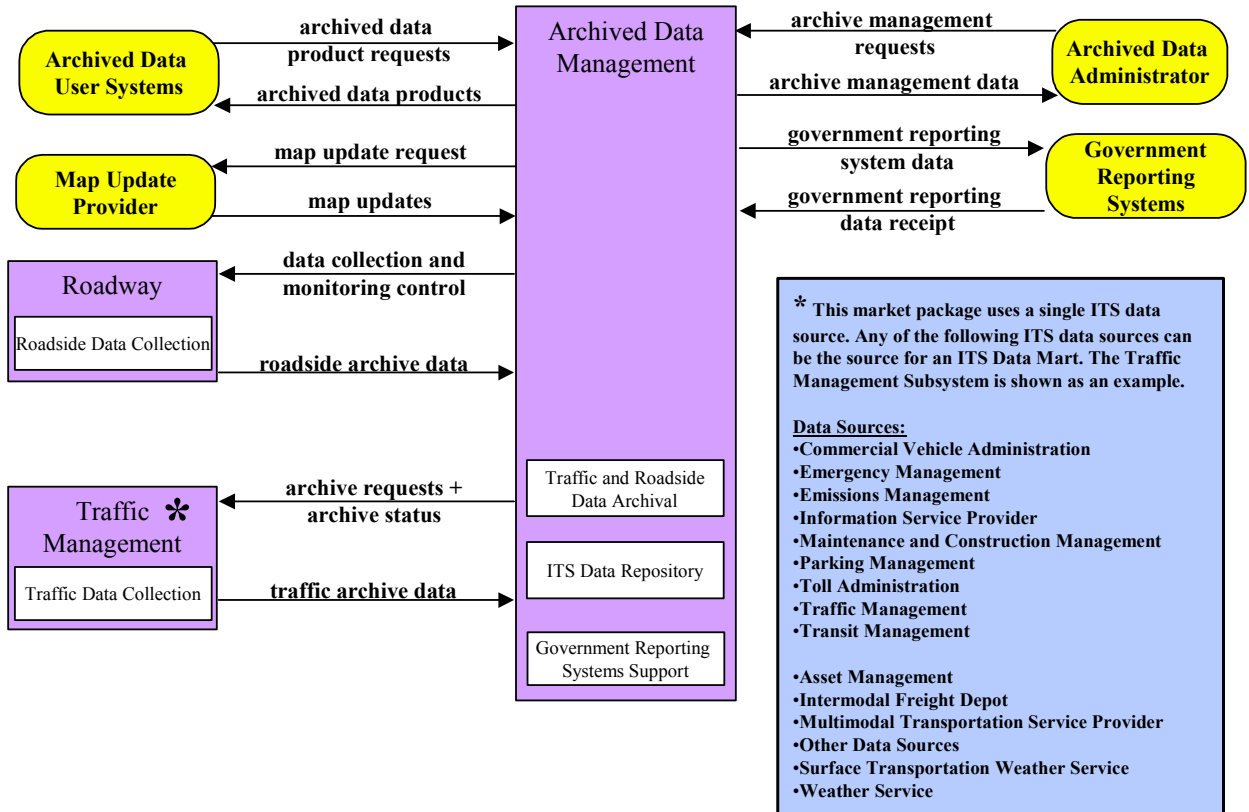
- Provides an archive that houses data collected and owned by a single agency, district, private sector provider, research institution, or other organization.
- Archive typically includes data covering a single transportation mode and one jurisdiction that is archived for future use.

### *Description:*

This market package provides a focused archive that houses data collected and owned by a single agency, district, private sector provider, research institution, or other organization. This focused archive typically includes data covering a single transportation mode and one jurisdiction that is collected from an operational data store and archived for future use. It provides the basic data quality, data privacy, and meta data management common to all ITS archives and provides general query and report access to archive data users.

Graphic:

### AD1 - ITS Data Mart



### Examples:

A database of incidents collected by a local transportation department.

## ITS DATA WAREHOUSE (AD2)

### *Synopsis:*

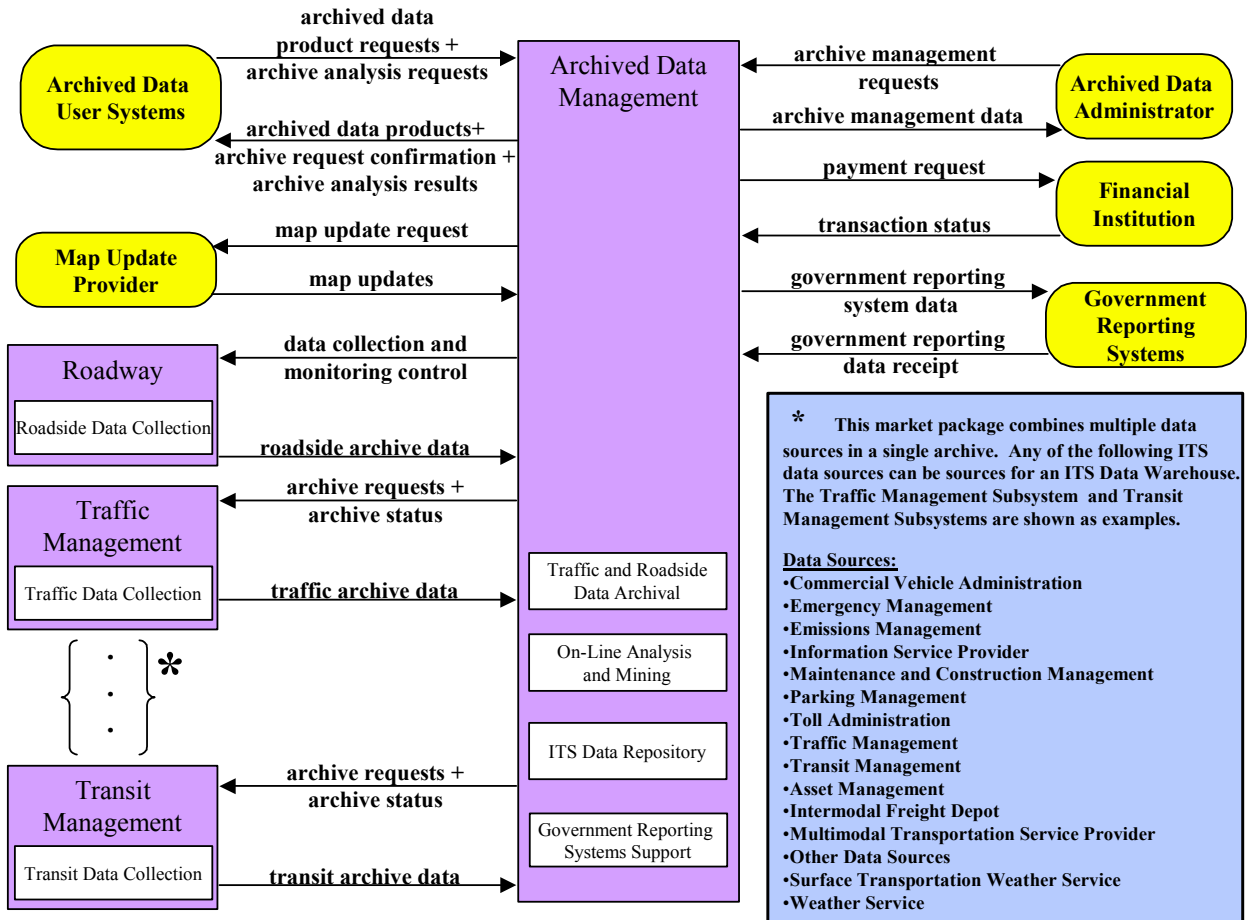
- Includes all the data collection and management capabilities provided by the ITS Data Mart.
- Adds the functionality to collect data from multiple agencies and data sources spanning across modal and jurisdictional boundaries.

### *Description:*

This market package includes all the data collection and management capabilities provided by the ITS Data Mart, and adds the functionality and interface definitions that allow collection of data from multiple agencies and data sources spanning across modal and jurisdictional boundaries. It performs the additional transformations and provides the additional meta data management features that are necessary so that all this data can be managed in a single repository with consistent formats. The potential for large volumes of varied data suggests additional on-line analysis and data mining features that are also included in this market package in addition to the basic query and reporting user access features offered by the ITS Data Mart.

Graphic:

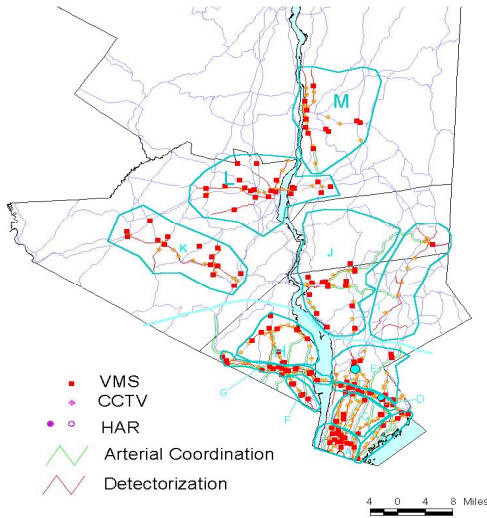
### AD2 - ITS Data Warehouse



**Examples:**

A regional system with inputs from multiple agencies to collect and analyze traffic and incident data.

# TRAFFIC MANAGEMENT (ATMS) BUNDLE



# TRAFFIC MANAGEMENT

## NETWORK SURVEILLANCE (ATMS01)

### *Synopsis:*

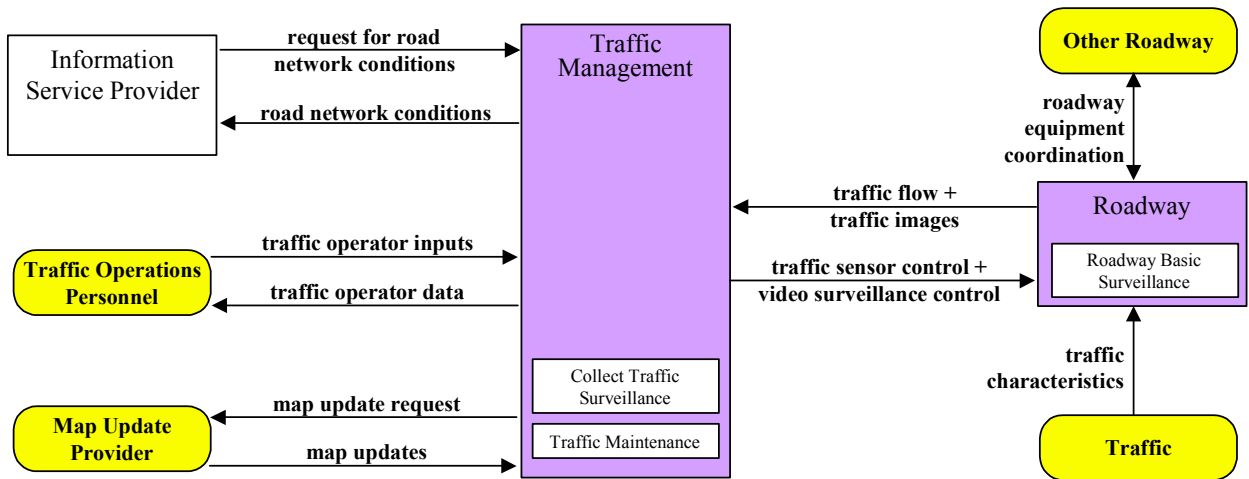
- Includes traffic detectors, surveillance equipment and communications systems to transmit data to the TMC.
- The data collected enables the monitoring of traffic and road conditions, identification and verification of incidents, detection of faults in detector operations.

### *Description:*

This market package includes traffic detectors, other surveillance equipment, the supporting field equipment, and wireline communications to transmit the collected data back to the Traffic Management Subsystem. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Subsystem). The data generated by this market package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Information Service Provider Subsystem.

*Graphic:*

### ATMS01 - Network Surveillance



*Examples:*

Traffic radar and loop detectors, Closed Circuit Television (CCTV) systems, etc.



## PROBE SURVEILLANCE (ATMS02)

### *Synopsis:*

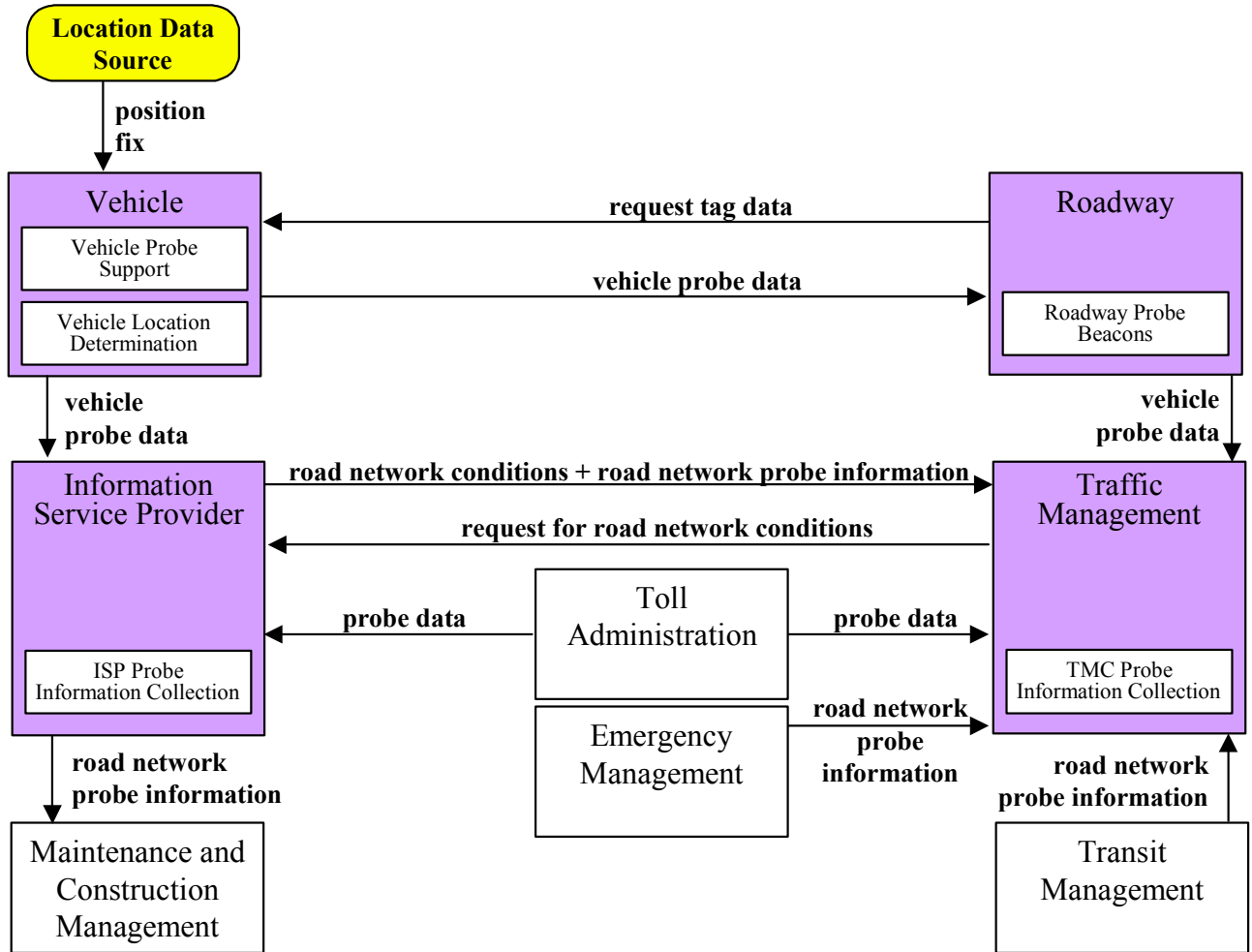
- Alternative approach for monitoring traffic and determining roadway conditions.
- Two implementation communications paths; wide-area wireless and short range.

### *Description:*

This market package provides an alternative approach for surveillance of the roadway network. Two general implementation paths are supported by this market package: 1) wide-area wireless communications between the vehicle and Information Service Provider is used to communicate current vehicle location and status, and 2) dedicated short range communications between the vehicle and roadside is used to provide equivalent information directly to the Traffic Management Subsystem. The first approach leverages wide area communications equipment that may already be in the vehicle to support personal safety and advanced traveler information services. The second approach utilizes vehicle equipment that supports toll collection, in-vehicle signing, and other short range communications applications identified within the architecture. The market package enables traffic managers to monitor road conditions, identify incidents, analyze and reduce the collected data, and make it available to users and private information providers. It requires one of the communications options identified above, roadside beacons and wireline communications for the short range communications option, data reduction software, and utilizes wireline links between the Traffic Management Subsystem and Information Service Provider Subsystem to share the collected information. Both “Opt out” and “Opt in” strategies are available to ensure the user has the ability to turn off the probe functions to ensure individual privacy. Due to the large volume of data collected by probes, data reduction techniques are required, such as the ability to identify and filter out-of-bounds or extreme data reports.

Graphic:

### ATMS02 - Probe Surveillance



**Examples:**

- Wide-area wireless – OnStar
- Short range - EZ-Pass toll collection
- Automatic Vehicle Identification

## SURFACE STREET CONTROL (ATMS03)

### *Synopsis:*

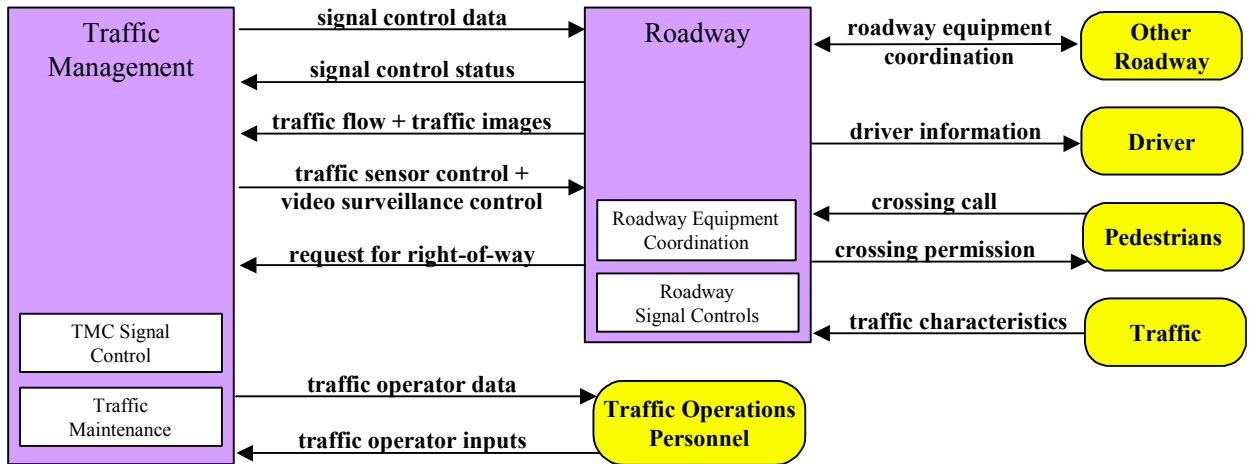
- Provides the centralized control and monitoring equipment, communication links and traffic signal control equipment that support local street control and/or arterial traffic management.
- Generally an intra-jurisdictional system.
- Can be fixed pre-timed systems or fully traffic responsive systems that dynamically adjust control plans based on current traffic conditions.

### *Description:*

This market package provides the central control and monitoring equipment, communication links, and the signal control equipment that support local surface street control and/or arterial traffic management. A range of traffic signal control systems are represented by this market package ranging from static pre-timed control systems to fully traffic responsive systems that dynamically adjust control plans and strategies based on current traffic conditions and priority requests. Additionally, general advisory and traffic control information can be provided to the driver while en route. This market package is generally an intra-jurisdictional package that does not rely on real-time communications between separate control systems to achieve area-wide traffic signal coordination. Systems that achieve coordination across jurisdictions by using a common time base or other strategies that do not require real time coordination would be represented by this package. This market package is consistent with typical urban traffic signal control systems.

*Graphic:*

### ATMS03 - Surface Street Control



### *Examples:*

Traffic signal control systems

- Pre-timed systems.
- Fully traffic responsive systems that dynamically adjust control plans and strategies based on current traffic conditions and priority requests.

## **FREEWAY CONTROL (ATMS04)**

### *Synopsis:*

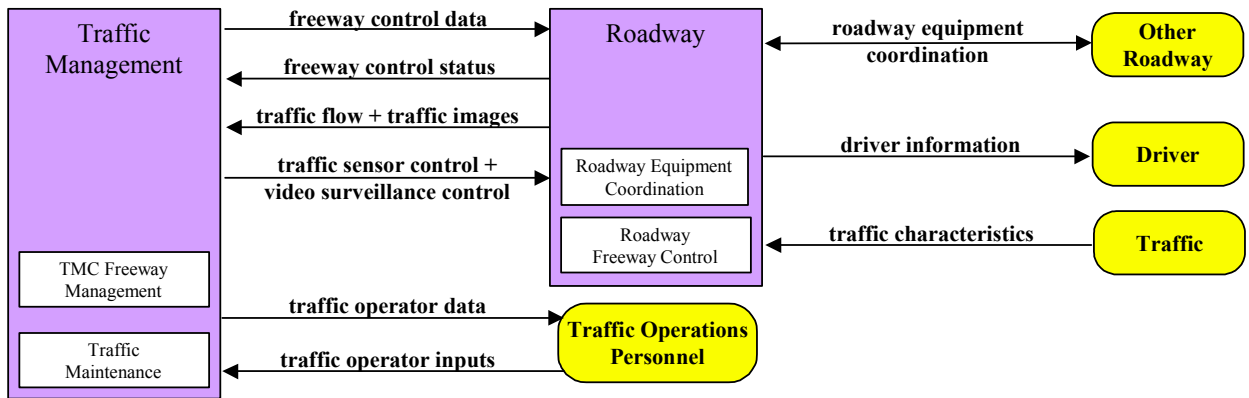
- Supports ramp control, freeway lane controls, and interchange control for freeways.
- Incorporates coordination of equipment used in the Network Surveillance Market Package.

### *Description:*

This market package provides the communications and roadside equipment to support ramp control, lane controls, and interchange control for freeways. Coordination and integration of ramp meters are included as part of this market package. This package is consistent with typical urban traffic freeway control systems. This package incorporates the instrumentation included in the Network Surveillance Market Package to support freeway monitoring and adaptive strategies as an option. This market package also includes the capability to utilize surveillance information for detection of incidents. Typically, the processing would be performed at a traffic management center; however, developments might allow for point detection with roadway equipment. For example, a CCTV might include the capability to detect an incident based upon image changes. Additionally, this market package allows general advisory and traffic control information to be provided to the driver while en route.

*Graphic:*

### ATMS04 - Freeway Control



*Examples:*

Ramp meters interface to traffic signals for dynamic signal operations.

## TRAFFIC INFORMATION DISSEMINATION (ATMS06)

### *Synopsis:*

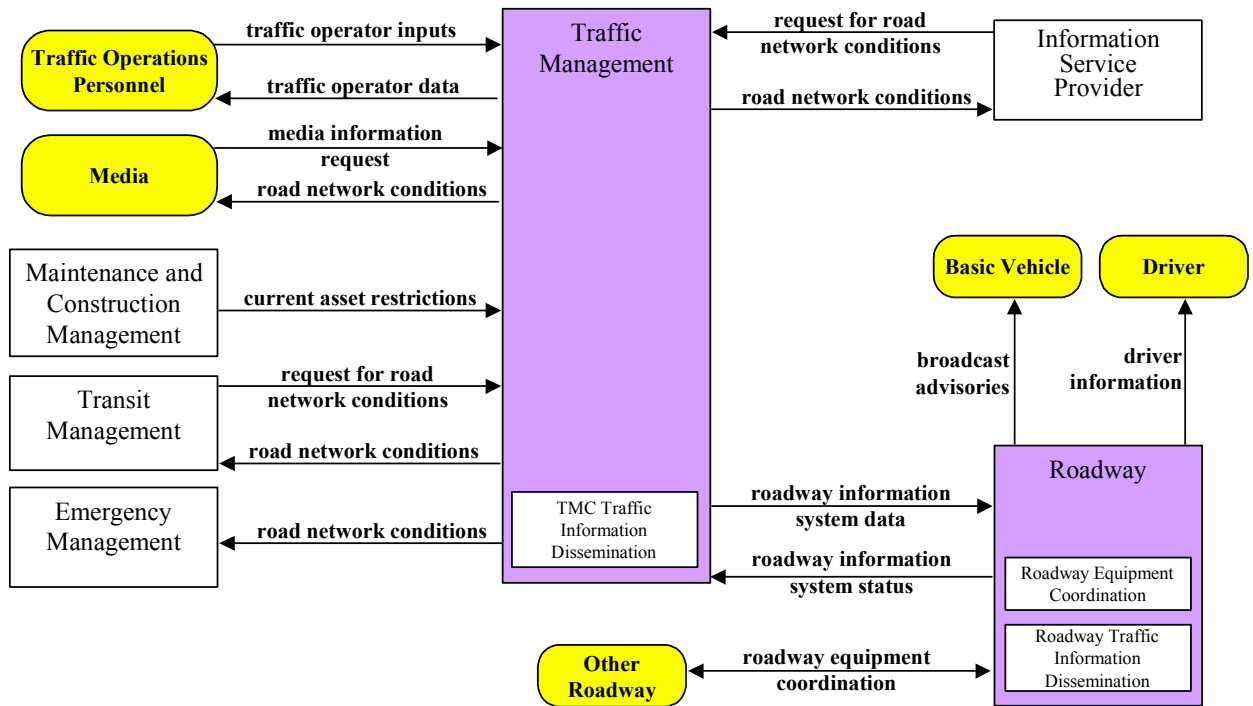
- Traffic, roadway and weather information is disseminated to drivers and vehicles using various roadway equipment.
- Provides traffic information from a TMC to the media, Transit Management, Emergency Management, other TMCs, and ISPs.

### *Description:*

This market package allows traffic information to be disseminated to drivers and vehicles using roadway equipment such as dynamic message signs or highway advisory radio. This package provides a tool that can be used to notify drivers of incidents; careful placement of the roadway equipment provides the information at points in the network where the drivers have recourse and can tailor their routes to account for the new information. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), Transit Management, Emergency Management, and Information Service Providers. A link to the Maintenance and Construction Management subsystem allows real time information on road/bridge closures due to maintenance and construction activities to be disseminated.

*Graphic:*

### ATMS06 Traffic Information Dissemination



### *Examples:*

Notify traveling public of incidents or congestion via:

- Dynamic Message Signs
- Highway Advisory Radio
- Web sites
- TV or radio stations



## REGIONAL TRAFFIC CONTROL (ATMS07)

### *Synopsis:*

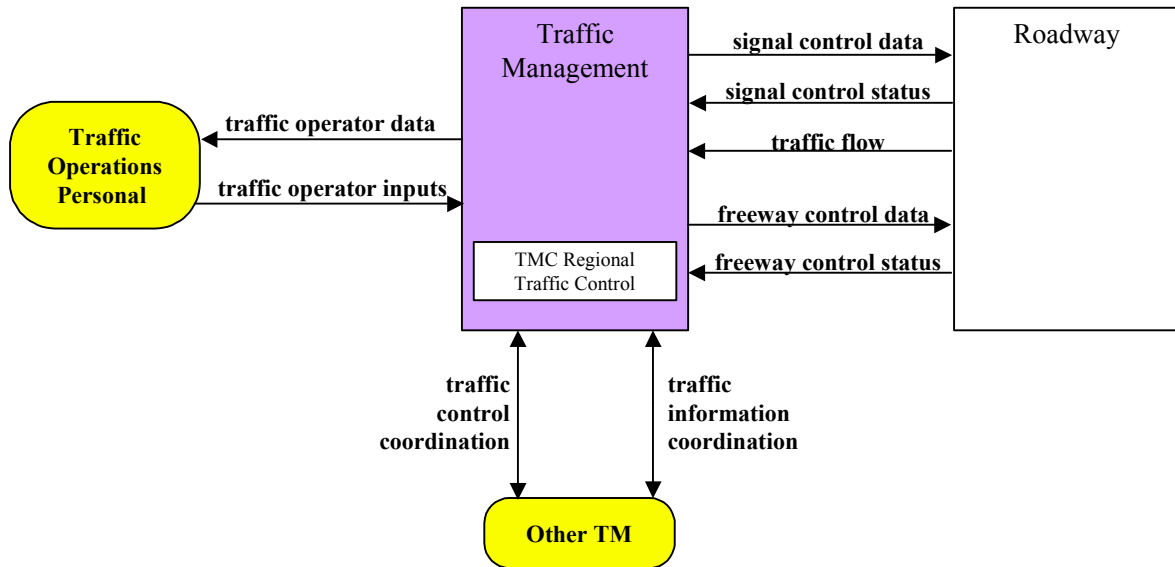
- Allows sharing of traffic information and control among traffic management centers.
- Enhances the coordination between regional traffic management centers (TMCs).
- Enables inter-jurisdictional traffic control.

### *Description:*

This market package provides for the sharing of traffic information and control among traffic management centers to support a regional control strategy. This market package advances the Surface Street Control and Freeway Control Market Packages by adding the communications links and integrated control strategies that enable integrated Interjurisdictional traffic control. The nature of optimization and extent of information and control sharing is determined through working arrangements between jurisdictions. This package relies principally on roadside instrumentation supported by the Surface Street Control and Freeway Control Market Packages and adds hardware, software, and wireline communications capabilities to implement traffic management strategies that are coordinated between allied traffic management centers. Several levels of coordination are supported from sharing of information through sharing of control between traffic management centers.

*Graphic:*

### ATMS07 - Regional Traffic Control



*Examples:*

Regional TMCs direct traffic flows based on shared information.  
TMCs and local traffic management systems have coordinated traffic management operations.

## INCIDENT MANAGEMENT SYSTEM (ATMS08)

### *Synopsis:*

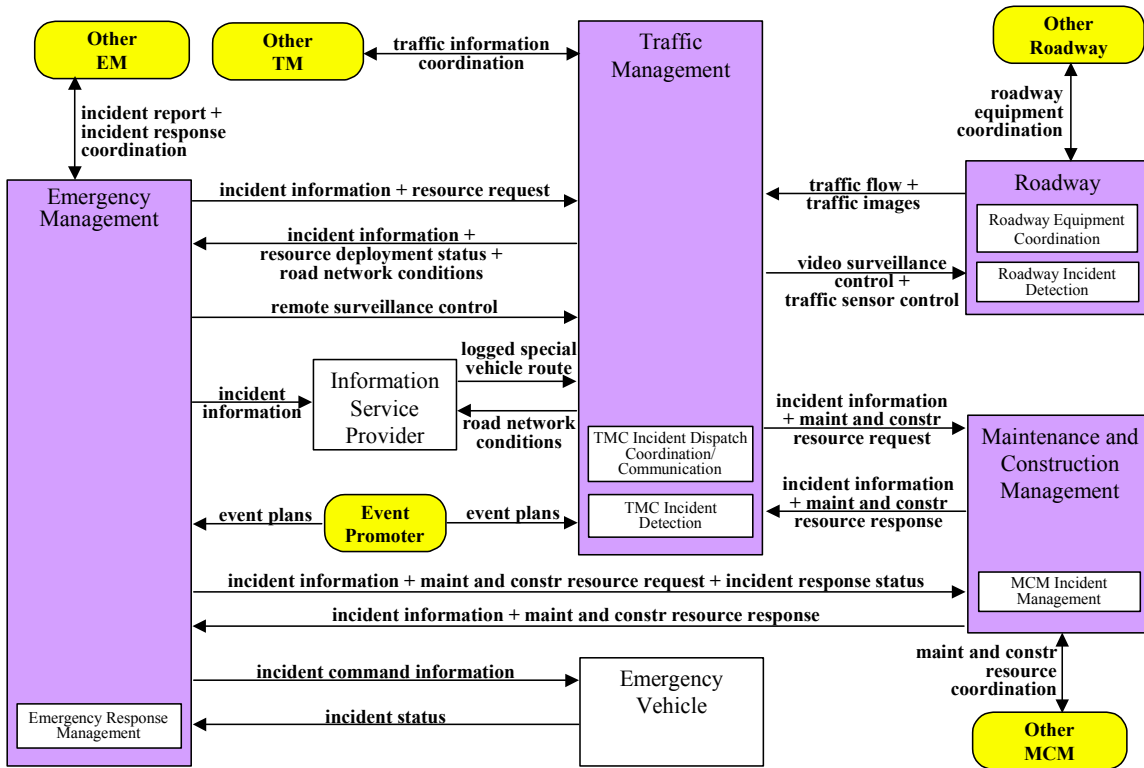
- Manages both unexpected incidents and planned events to minimize the impact to the transportation network and traveler safety.
- Information is collected from multiple sources and correlated to detect and verify incidents, implement appropriate responses and disseminate information to travelers.

### *Description:*

This market package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The market package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as weather service entities and event promoters. Information from these diverse sources are collected and correlated by this market package to detect and verify incidents and implement an appropriate response. This market package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between center subsystems. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination market package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information market packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through a CAD system or through other communication with emergency field personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel.

Graphic:

### ATMS08 - Incident Management System



Examples:

Once an incident is detected the dispatching of public safety, emergency management and maintenance and construction management resources is coordinated by the incident management system. Predetermined traffic control strategies are implemented.

- Detection equipment such as CCTV, Microloop, etc
- Responses include resource coordination between TMCs

## TRAFFIC FORECAST AND DEMAND MANAGEMENT (ATMS09)

### *Synopsis:*

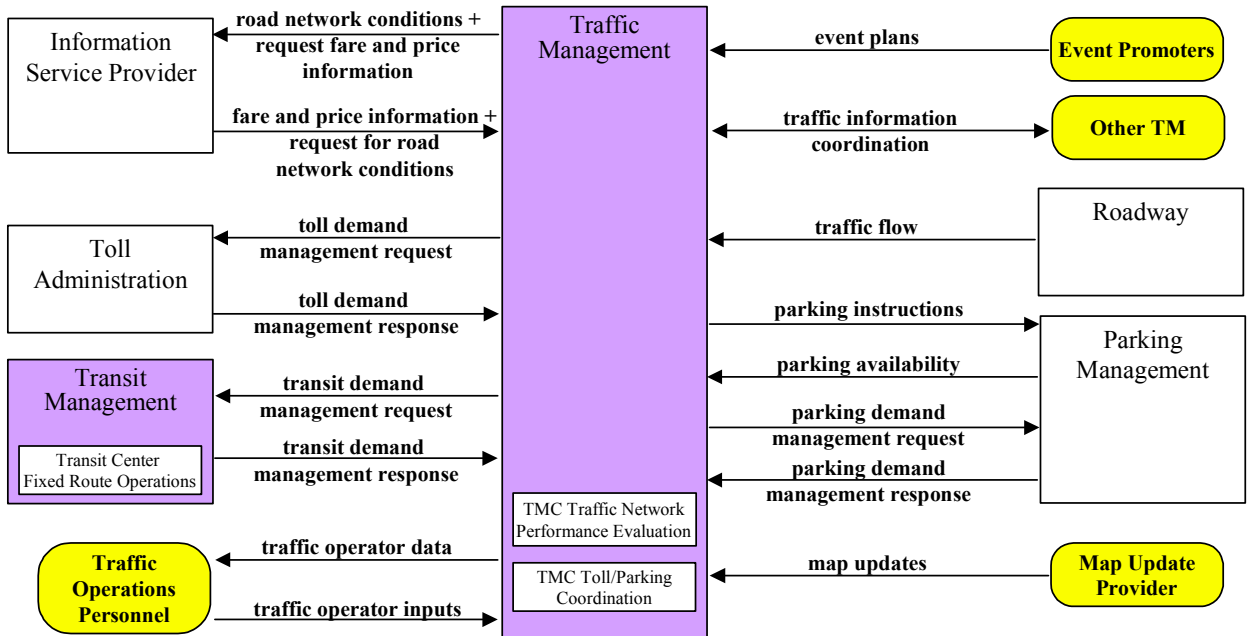
- Advanced algorithms to forecast and assess real-time roadway network performance
- Source data is gathered from a variety of sources for evaluation

### *Description:*

This market package includes advanced algorithms, processing, and mass storage capabilities that support historical evaluation, real-time assessment, and forecast of the roadway network performance. This includes the prediction of travel demand patterns to support better link travel time forecasts. The source data would come from the Traffic Management Subsystem itself as well as other traffic management centers and forecasted traffic loads derived from route plans supplied by the Information Service Provider Subsystem. This market package provides data that supports the implementation of TDM programs, and policies managing both traffic and the environment. The package collects information on vehicle pollution levels, parking availability, usage levels, and vehicle occupancy to support these functions. Demand management requests can also be made to Toll Administration, Transit Management, and Parking Management Subsystems.

*Graphic:*

### ATMS09 - Traffic Forecast and Demand Management



*Examples:*

Data from traffic studies during a regional event is used to forecast future traffic loads and determine alternate routes for a similar upcoming event. Real-time traffic data is used to make adjustments in suggested routing.

## ELECTRONIC TOLL COLLECTION (ATMS10)

### *Synopsis:*

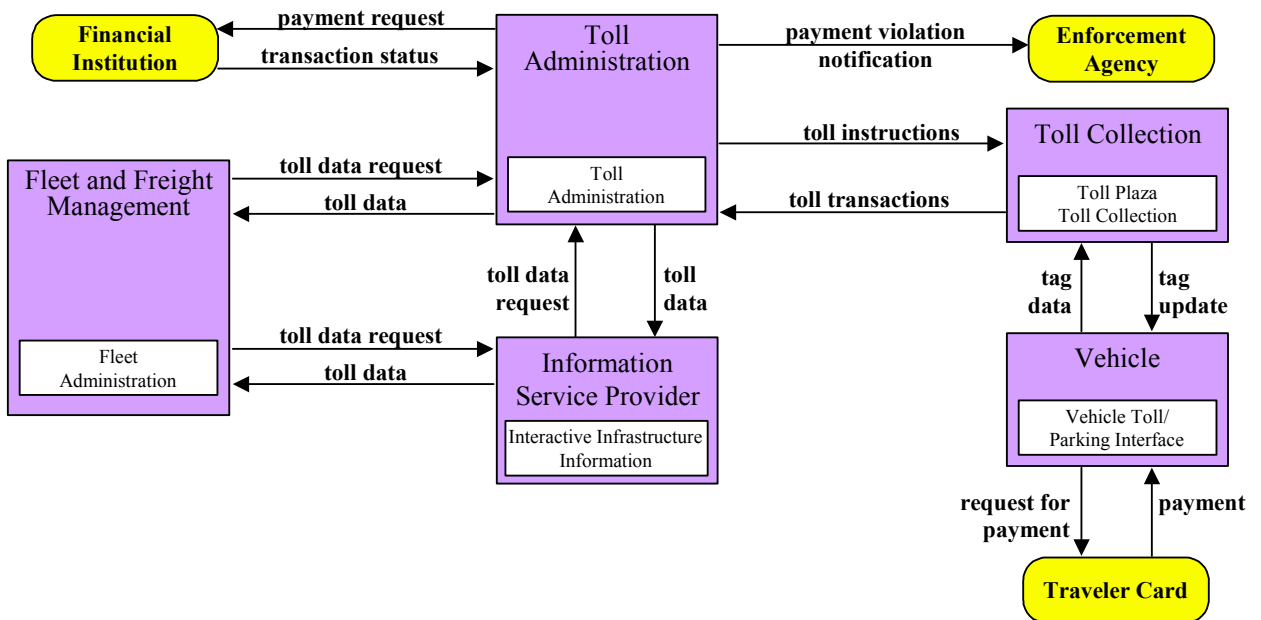
- Provides toll operators with the ability to collect tolls electronically and detect and process violations.
- Requires short range communication between the roadway equipment and the vehicle.
- Vehicle tags of toll violators can be read and fines electronically posted to vehicle owners.

### *Description:*

This market package provides toll operators with the ability to collect tolls electronically and detect and process violations. The fees that are collected may be adjusted to implement demand management strategies. Dedicated short range communication between the roadway equipment and the vehicle is required as well as wireline interfaces between the toll collection equipment and transportation authorities and the financial infrastructure that supports fee collection. Vehicle tags of toll violators are read and electronically posted to vehicle owners. Standards, inter-agency coordination, and financial clearinghouse capabilities enable regional, and ultimately national interoperability for these services. The toll tags and roadside readers that these systems utilize can also be used to collect road use statistics for highway authorities. This data can be collected as a natural by-product of the toll collection process or collected by separate readers that are dedicated to probe data collection.

Graphic:

### ATMS10 - Electronic Toll Collection



Examples:

EZ-Pass Toll Collection.



## STANDARD RAILROAD GRADE CROSSING (ATMS13)

### *Synopsis:*

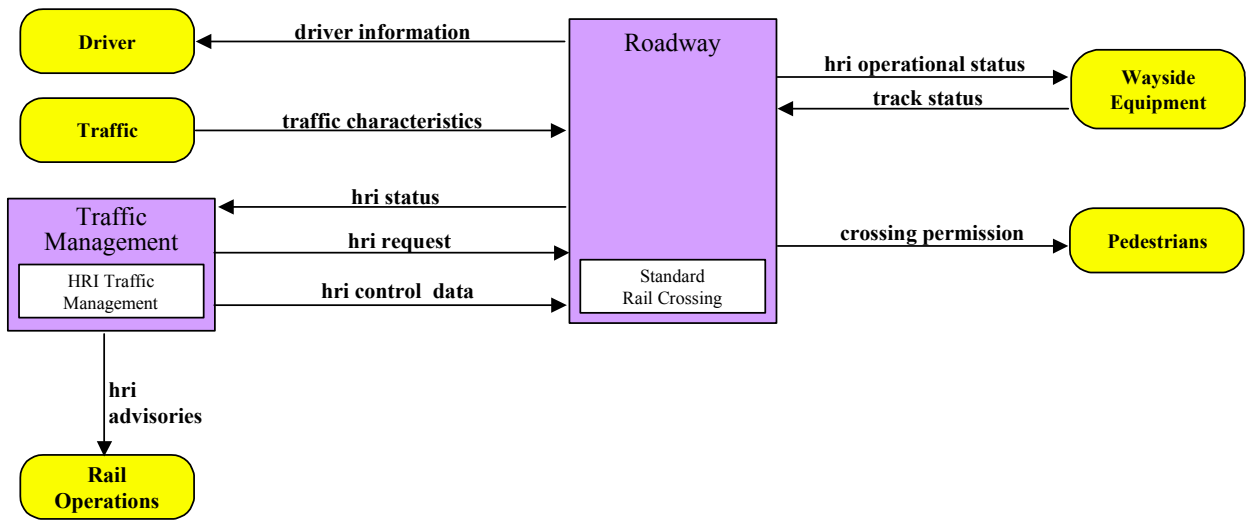
- Provides basic management of highway traffic at Highway Rail Intersections (HRI).
- Passive and active warning systems.
- Rail speeds of under 80 mph.
- Communication of HRI and equipment status to Rail and Traffic management centers.

### *Description:*

This market package manages highway traffic at highway-rail intersections (HRIs) where operational requirements do not dictate more advanced features (e.g., where rail operational speeds are less than 80 miles per hour). Both passive (e.g., the crossbuck sign) and active warning systems (e.g., flashing lights and gates) are supported. (Note that passive systems exercise only the single interface between the roadway subsystem and the driver in the architecture definition.) These traditional HRI warning systems may also be augmented with other standard traffic management devices. The warning systems are activated on notification by interfaced wayside equipment of an approaching train. The equipment at the HRI may also be interconnected with adjacent signalized intersections so that local control can be adapted to highway-rail intersection activities. Health monitoring of the HRI equipment and interfaces is performed; detected abnormalities are reported to both highway and railroad officials through wayside interfaces and interfaces to the traffic management subsystem.

*Graphic:*

### ATMS13 - Standard Railroad Grade Crossing



*Examples:*

Crossbuck signs (passive warning) and flashing lights, gate warning systems (active warning).

## ADVANCED RAILROAD GRADE CROSSING (ATMS14)

### *Synopsis:*

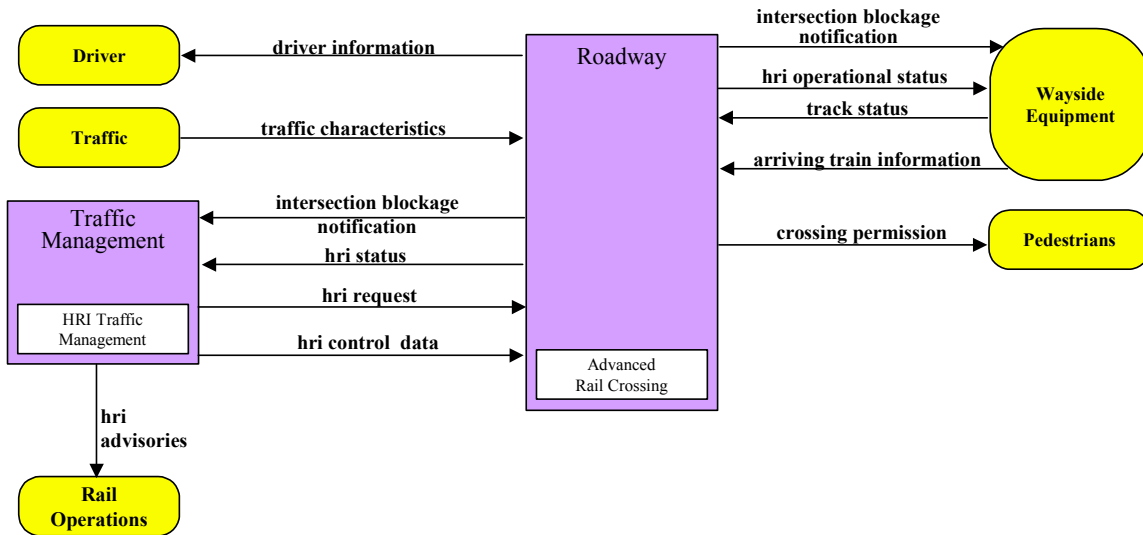
- Additional safety features to mitigate the risks associated with higher rail speeds.
- Rail speeds of over 80 mph.
- Includes barriers to preclude entry into the intersection.
- Additional detection capabilities.

### *Description:*

This market package manages highway traffic at highway-rail intersections (HRIs) where operational requirements demand advanced features (e.g., where rail operational speeds are greater than 80 miles per hour). This market package includes all capabilities from the Standard Railroad Grade Crossing Market Package and augments these with additional safety features to mitigate the risks associated with higher rail speeds. The active warning systems supported by this market package include positive barrier systems that preclude entrance into the intersection when the barriers are activated. Like the Standard Package, the HRI equipment is activated on notification by wayside interface equipment which detects, or communicates with the approaching train. In this market package, the wayside equipment provides additional information about the arriving train so that the train's direction of travel, estimated time of arrival, and estimated duration of closure may be derived. This enhanced information may be conveyed to the driver prior to, or in context with, warning system activation. This market package also includes additional detection capabilities that enable it to detect an entrapped or otherwise immobilized vehicle within the HRI and provide an immediate notification to highway and railroad officials.

*Graphic:*

### ATMS14 - Advanced Railroad Grade Crossing



### *Examples:*

Detectors sense a vehicle stalled in the intersection and notify the oncoming train and TMC.

## RAILROAD OPERATIONS COORDINATION (ATMS15)

### *Synopsis:*

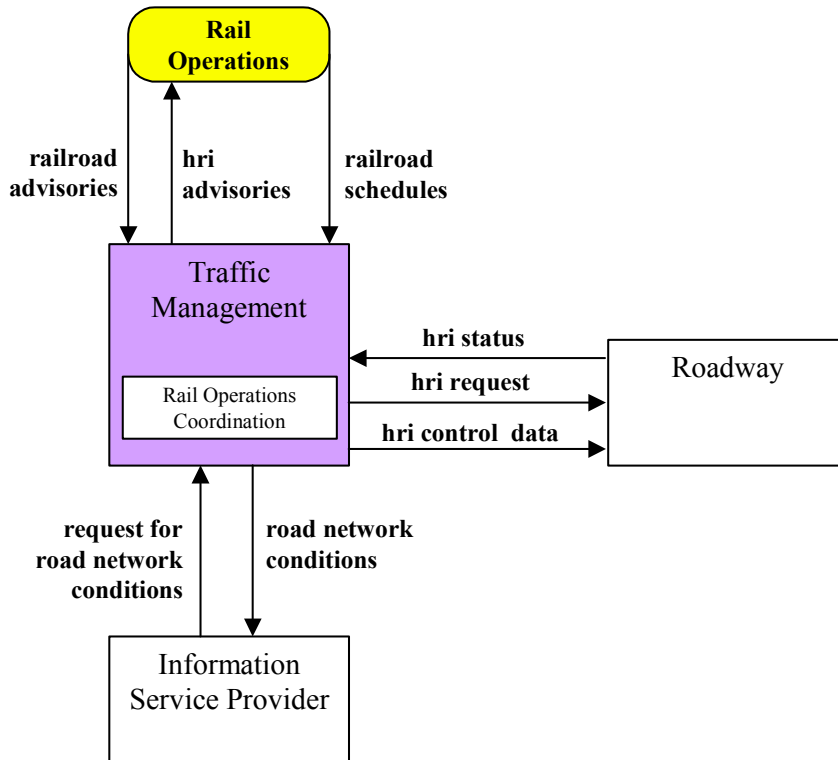
- Provides an additional level of strategic coordination between rail operations and TMCs.
- Rail operations provides train schedules, maintenance schedules and other forecast events that will result in Highway Rail Intersection closures.

### *Description:*

This market package provides an additional level of strategic coordination between rail operations and traffic management centers. Rail operations provides train schedules, maintenance schedules, and any other forecast events that will result in highway-rail intersection (HRI) closures. This information is used to develop forecast HRI closure times and durations that may be used in advanced traffic control strategies or to enhance the quality of traveler information.

*Graphic:*

### ATMS15 - Railroad Operations Coordination



*Examples:*

Facilitates forecasting Highway Rail Intersection closures.

## REVERSIBLE LANE MANAGEMENT (ATMS18)

### *Synopsis:*

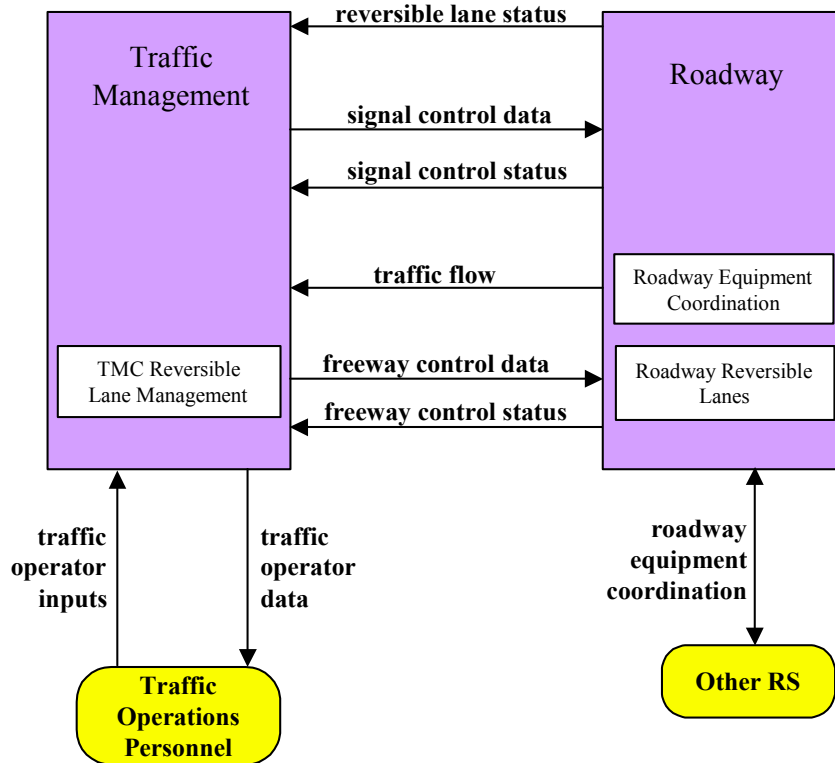
- Provides for the management of reversible lane facilities.
- Includes the equipment used to reconfigure intersections and manage right-of-way to address dynamic demand changes.
- Utilizes standard surveillance capabilities and also includes sensory functions that detect wrong-way vehicles.
- Also utilizes other special surveillance capabilities that mitigate safety hazards associated with reversible lanes.

### *Description:*

This market package provides for the management of reversible lane facilities. In addition to standard surveillance capabilities, this market package includes sensory functions that detect wrong-way vehicles and other special surveillance capabilities that mitigate safety hazards associated with reversible lanes. The package includes the field equipment, physical lane access controls, and associated control electronics that manage and control these special lanes. This market package also includes the equipment used to electronically reconfigure intersections and manage right-of-way to address dynamic demand changes and special events.

Graphic:

### ATMS18 - Reversible Lane Management



Examples:

Reversing traffic flow direction across a bridge during morning and evening rush hour traffic.



## SPEED MONITORING (ATMS19)

### *Synopsis:*

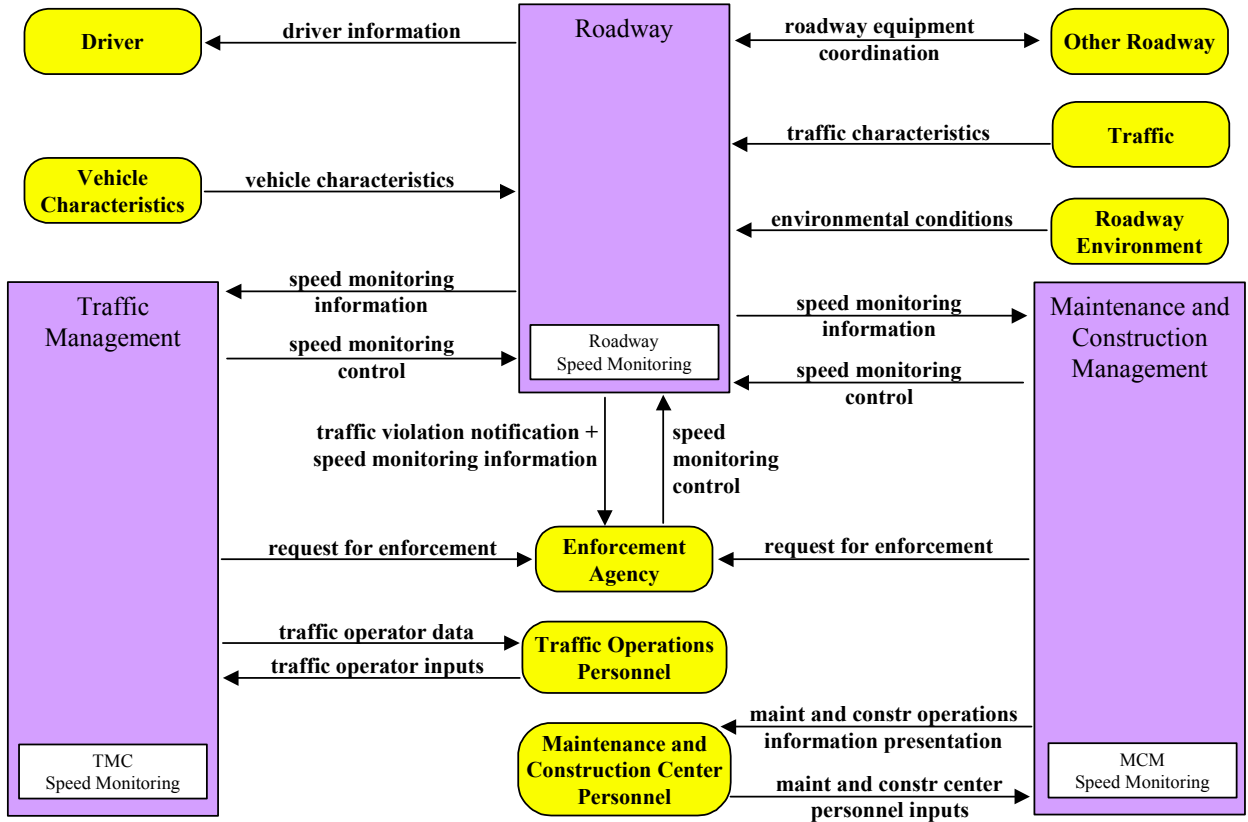
- Monitors the speeds of vehicles traveling through a roadway system.
- Can provide notifications to an enforcement agency of vehicles speeding as percentages of total traffic.
- Can monitor environmental conditions and display a safe driving speed.

### *Description:*

This market package monitors the speeds of vehicles traveling through a roadway system. If the speed is determine to be excessive, roadside equipment can suggest a safe driving speed. Environmental conditions may be monitored and factored into the safe speed advisories that are provided to the motorist. This service can also support notifications to an enforcement agency to enforce the speed limit on a roadway system.

Graphic:

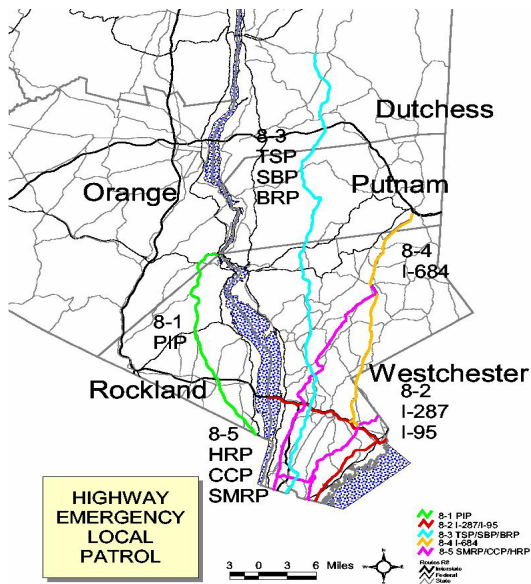
### ATMS19 - Speed Monitoring



**Examples:**

Portable speed sensing and message sign trailers set up to notify drivers of their speed in areas where violations are increasing.

# EMERGENCY MANAGEMENT (EM) BUNDLE



# EMERGENCY MANAGEMENT

## EMERGENCY RESPONSE (EM11)

### *Synopsis:*

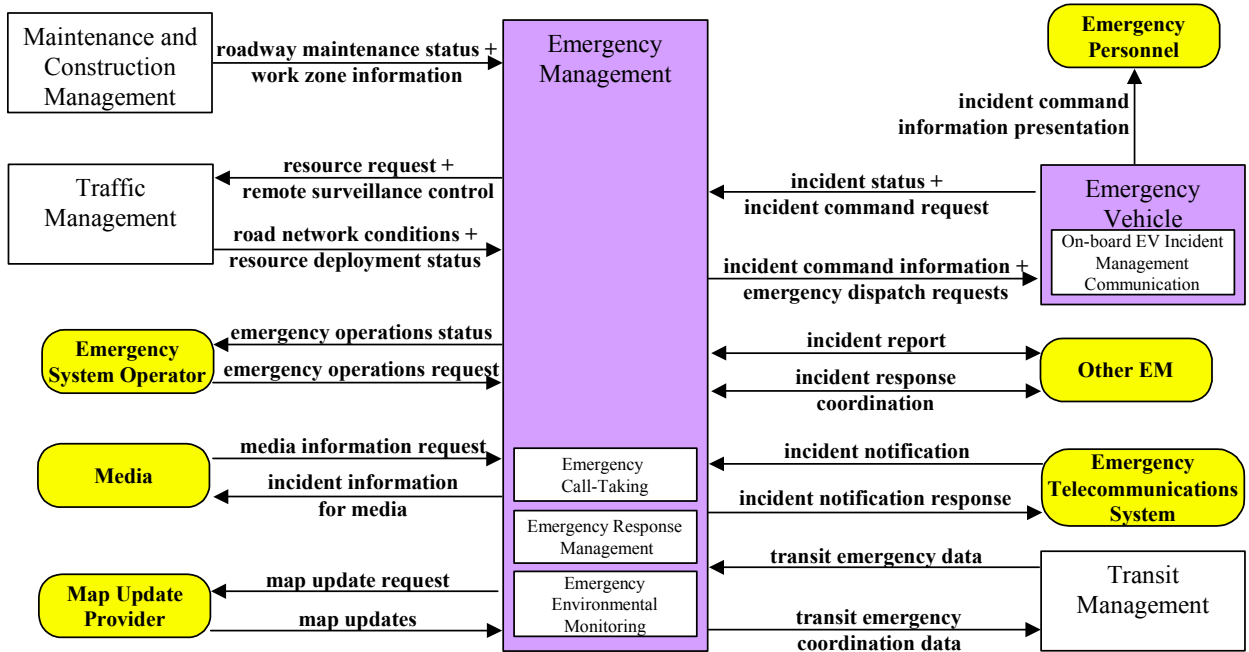
- Enables safe and rapid deployment of appropriate resources to an emergency.

### *Description:*

This market package includes emergency vehicle equipment, equipment used to receive and route emergency calls, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. Coordination between Emergency Management Subsystems supports emergency notification and coordinated response between agencies. Existing wide area wireless communications would be utilized between the Emergency Management Subsystem and an Emergency Vehicle to enable an incident command system to be established and supported at the emergency location. Public safety, traffic management, and many other allied agencies may each participate in the coordinated response managed by this package.

*Graphics:*

**EM1 - Emergency Response**



*Examples:*

When incidents occur, a coordinated response between Police, Fire, EMS agencies is possible.

## EMERGENCY ROUTING (EM2)

### *Synopsis:*

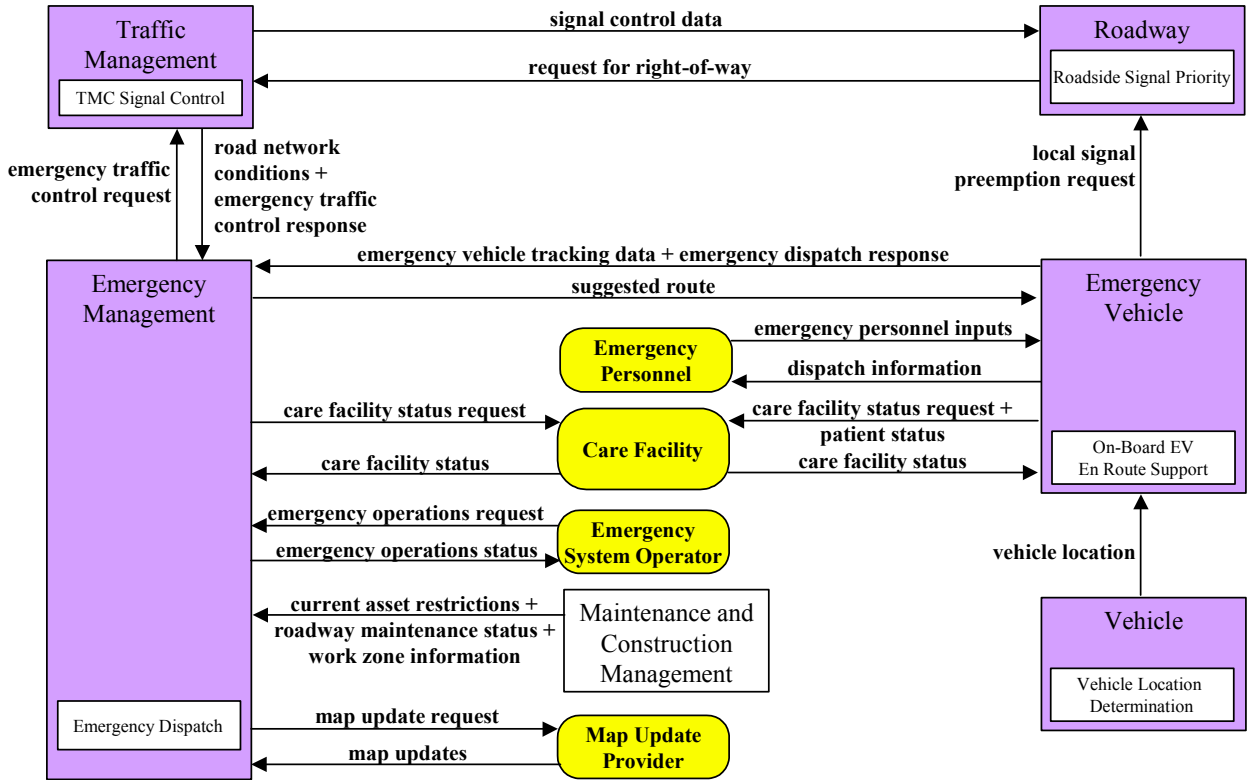
- Dynamic routing of emergency vehicles based on real-time traffic conditions.
- Requests special priority or traffic control strategies on the selected route(s).

### *Description:*

This market package supports automated vehicle location and dynamic routing of emergency vehicles. The service also supports coordination with the Traffic Management Subsystem, collecting detailed road network conditions and requesting special priority or other specific emergency traffic control strategies on the selected route(s). The Emergency Management Subsystem provides the routing for the emergency fleet based on real-time traffic conditions. The Emergency Vehicle may also be equipped with dedicated short range communications for local signal preemption. The service provides for information exchange between care facilities and both the Emergency Management Subsystem and emergency vehicles.

*Graphics:*

**EM2 - Emergency Routing**



*Examples:*

Routing of emergency equipment is re-directed to avoid a recent congestion situation on a roadway.

## MAYDAY SUPPORT (EM3)

### *Synopsis:*

- Initiate a request for emergency assistance.
- Locate the requestor and determine the appropriate response.
- General surveillance monitor public areas to improve security.

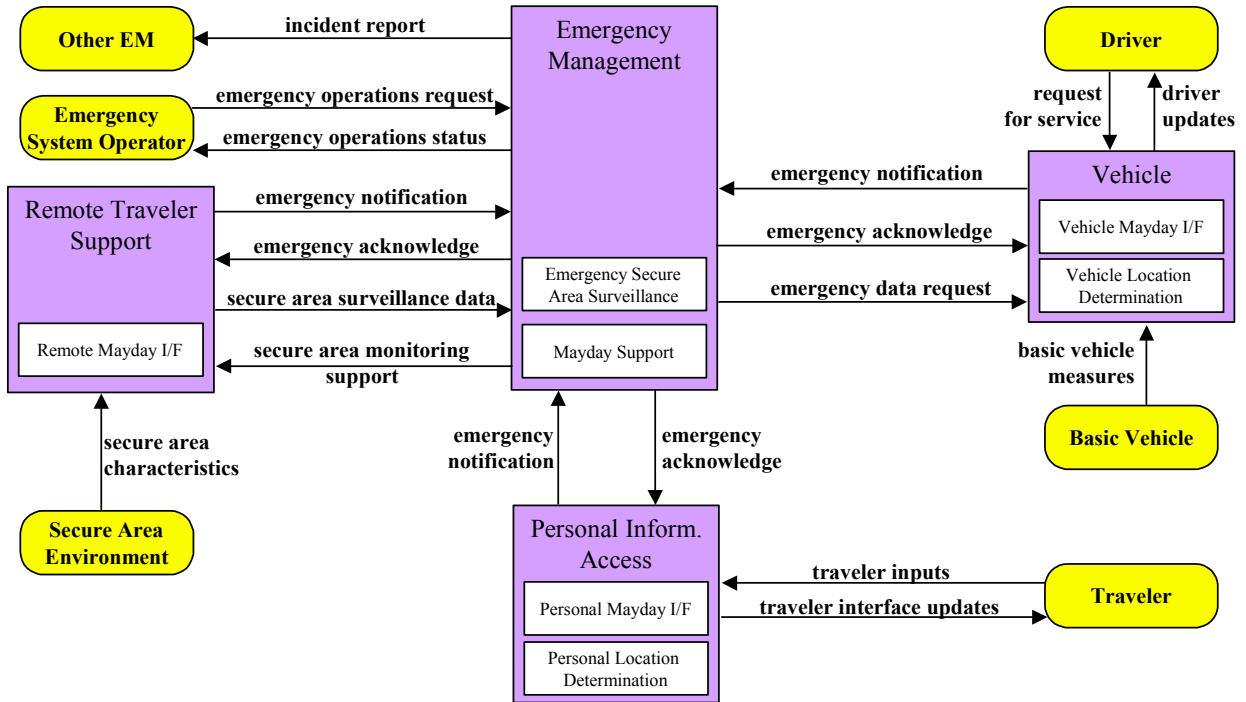
### *Description:*

This market package allows the user (driver or non-driver) to initiate a request for emergency assistance and enables the Emergency Management Subsystem to locate the user and determine the appropriate response. This market package also includes general surveillance capabilities that enable the Emergency Management Subsystem to remotely monitor public areas (e.g., rest stops, parking lots) to improve security in these areas. The Emergency Management Subsystem may be operated by the public sector or by a private sector provider. The request from the traveler needing assistance may be manually initiated or automated and linked to vehicle sensors. The surveillance data and any requests for assistance are sent to the Emergency Management subsystem using both data and voice communications.



Graphics:

### EM3 - Mayday Support



**Examples:**

A traveler uses roadside call box to request assistance.

On-board sensors detect a problem with a vehicle and initiate a request for towing service.

## ROADWAY SERVICE PATROLS (EM4)

### *Synopsis:*

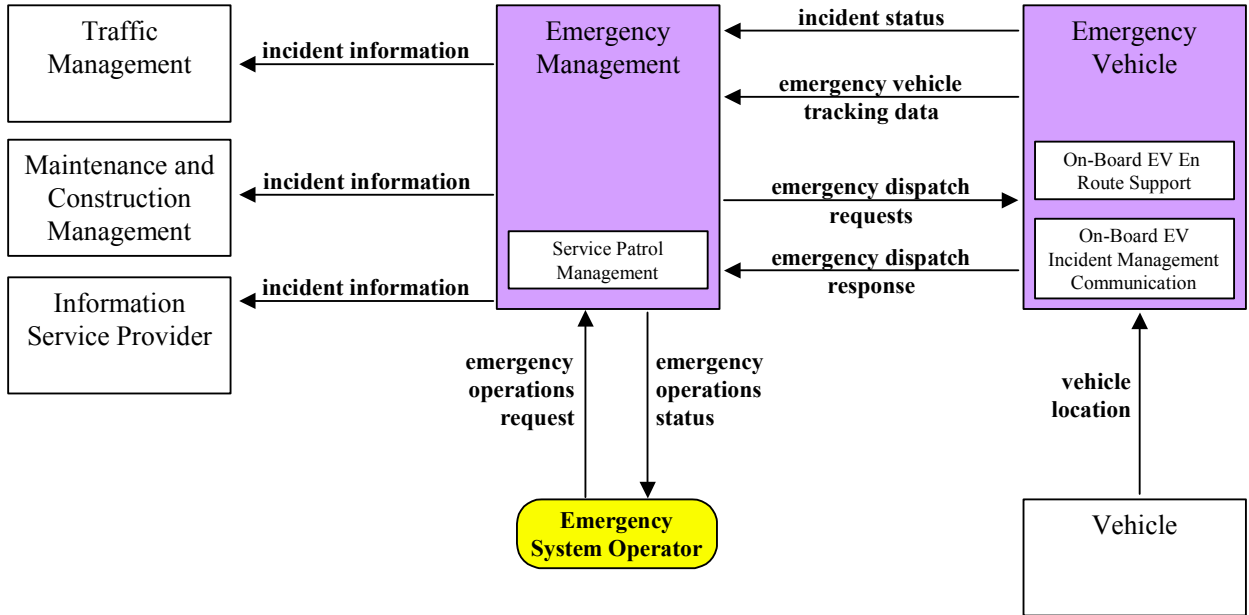
- Service patrol vehicles that monitor roads that typically have incidents.
- Rapid response to minor incidents to minimize disruption to the traffic stream.

### *Description:*

This market package supports roadway service patrol vehicles that monitor roads that typically have incidents, offering rapid response to minor incidents (flat tire, accidents, out of gas) to minimize disruption to the traffic stream. If problems are detected, the roadway service patrol vehicles will provide assistance to the motorist (e.g., push a vehicle to the shoulder or median).

*Graphics:*

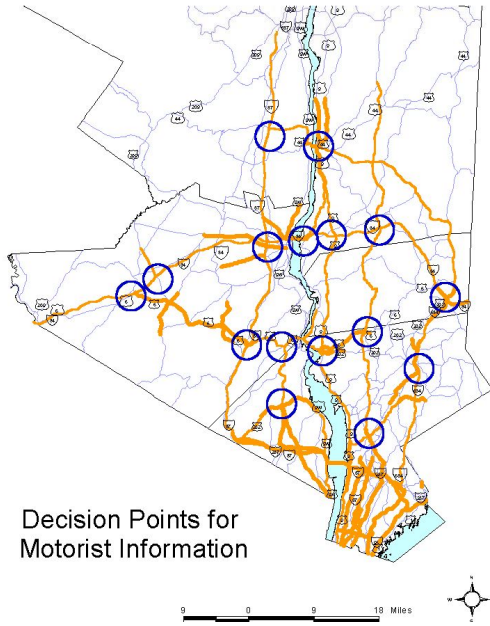
**EM4 - Roadway Service Patrols**



*Examples:*

Provide assistance to motorist with minor incidents (flat tire, accidents, out of gas).

# TRAVELER INFORMATION (ATIS) BUNDLE



Decision Points for  
Motorist Information

# TRAVELER INFORMATION

## BROADCAST TRAVELER INFORMATION (ATIS1)

### *Synopsis:*

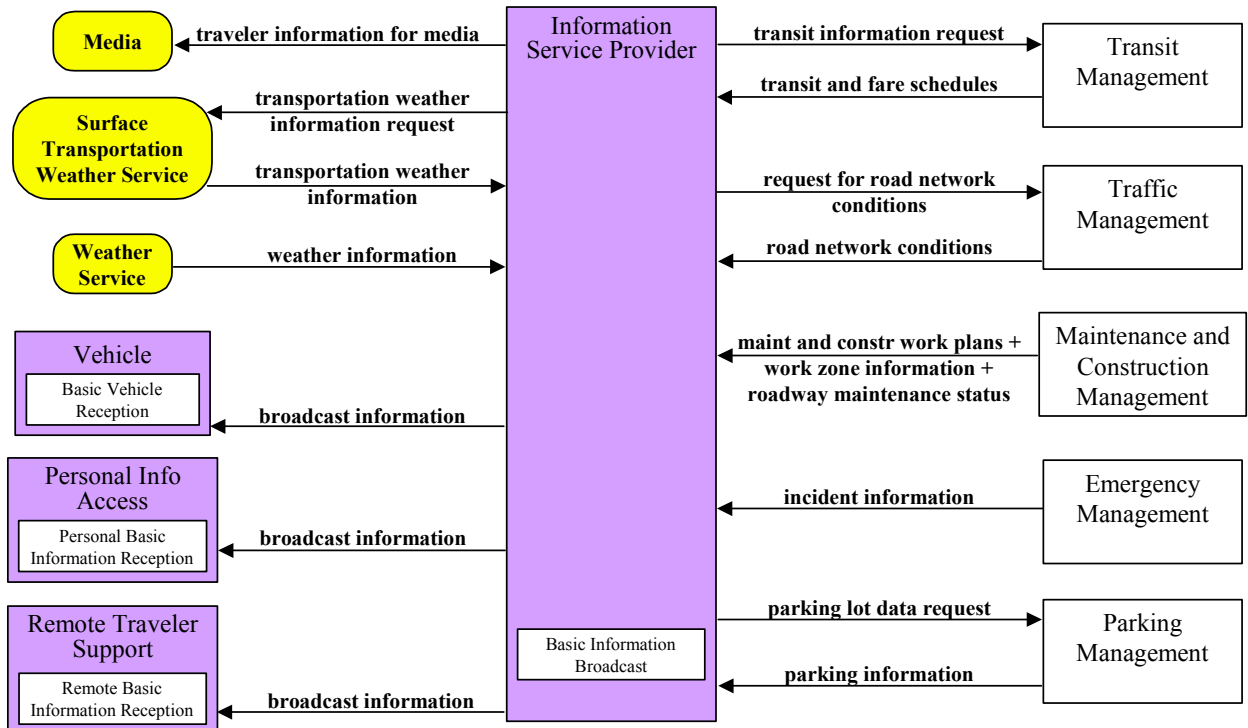
- Disseminates general traffic and travel information through existing infrastructures over a wide area.
- Information provided to travelers or merchants.

### *Description:*

This market package collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, air quality and weather information, and broadly disseminates this information through existing infrastructures and low cost user equipment (e.g., FM subcarrier, cellular data broadcast). The information may be provided directly to travelers or provided to merchants and other traveler service providers so that they can better inform their customers of travel conditions. Different from the market package ATMS6 - Traffic Information Dissemination, which provides localized HAR and DMS information capabilities, ATIS1 provides a wide area digital broadcast service. Successful deployment of this market package relies on availability of real-time traveler information from roadway instrumentation, probe vehicles or other sources.

Graphic:

### ATIS1 - Broadcast Traveler Information



### Examples:

Communication through car radio, cellular device, or web sites.

## INTERACTIVE TRAVELER INFORMATION (ATIS2)

### *Synopsis:*

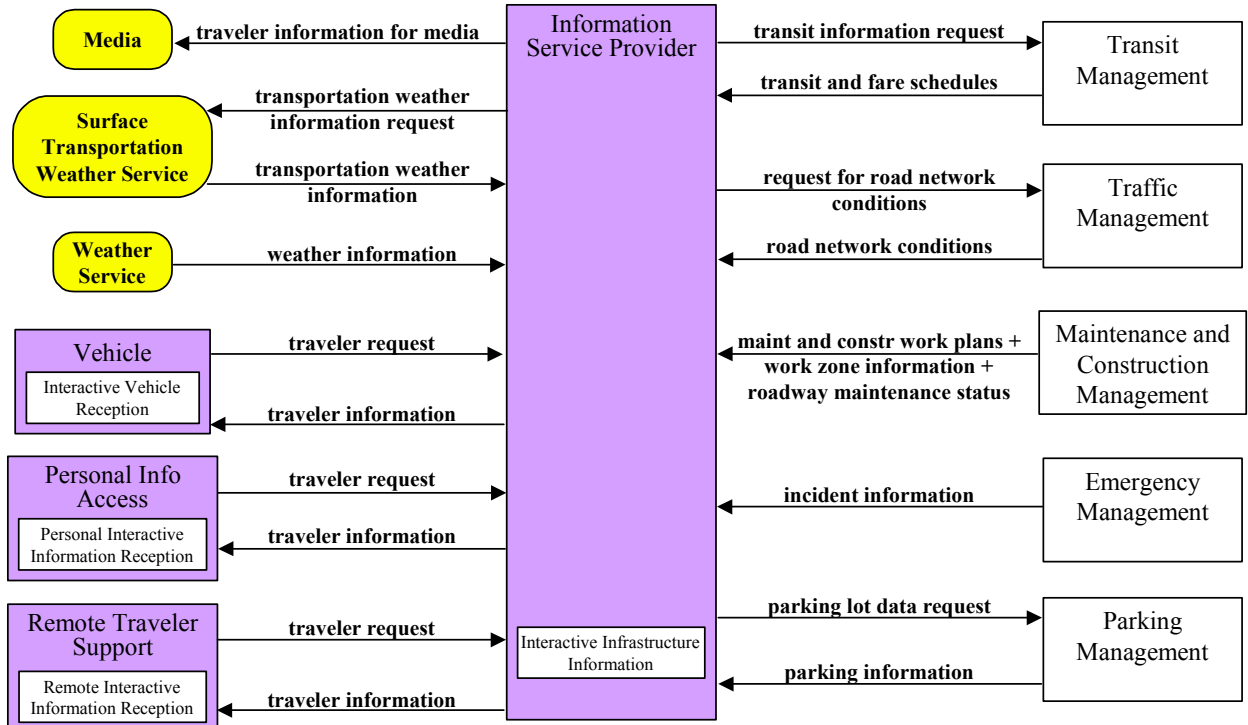
- Provides “tailored information” in response to a traveler request.
- Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported.
- Allows merchants to receive traffic information to their personal devices or remote traveler systems to better inform customers of road travel conditions.

### *Description:*

This market package provides tailored information in response to a traveler request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported. The traveler can obtain current information regarding traffic conditions, transit services, ride share/ride match, parking management, and pricing information. A range of two-way wide-area wireless and wireline communications systems may be used to support the required data communications between the traveler and Information Service Provider. A variety of interactive devices may be used by the traveler to access information prior to a trip or en route including phone, kiosk, Personal Digital Assistant, personal computer, and a variety of in-vehicle devices. This market package also allows merchants to receive traffic information to their personal devices or remote traveler systems to better inform customers of road travel conditions. Successful deployment of this market package relies on availability of real-time transportation data from roadway instrumentation, probe vehicles or other means. A traveler may also input personal preferences and identification information via a “traveler card” that can convey information to the system about the traveler as well as receive updates from the system so the card can be updated over time.

*Graphic:*

**ATIS2 - Interactive Traveler Information**



**Examples:**

Can obtain information regarding traffic conditions, transit services, ride share/ride match, parking management, and pricing information. Supports phone, kiosk, PDA, personal computer, etc.



## ISP BASED ROUTE GUIDANCE (ATIS5)

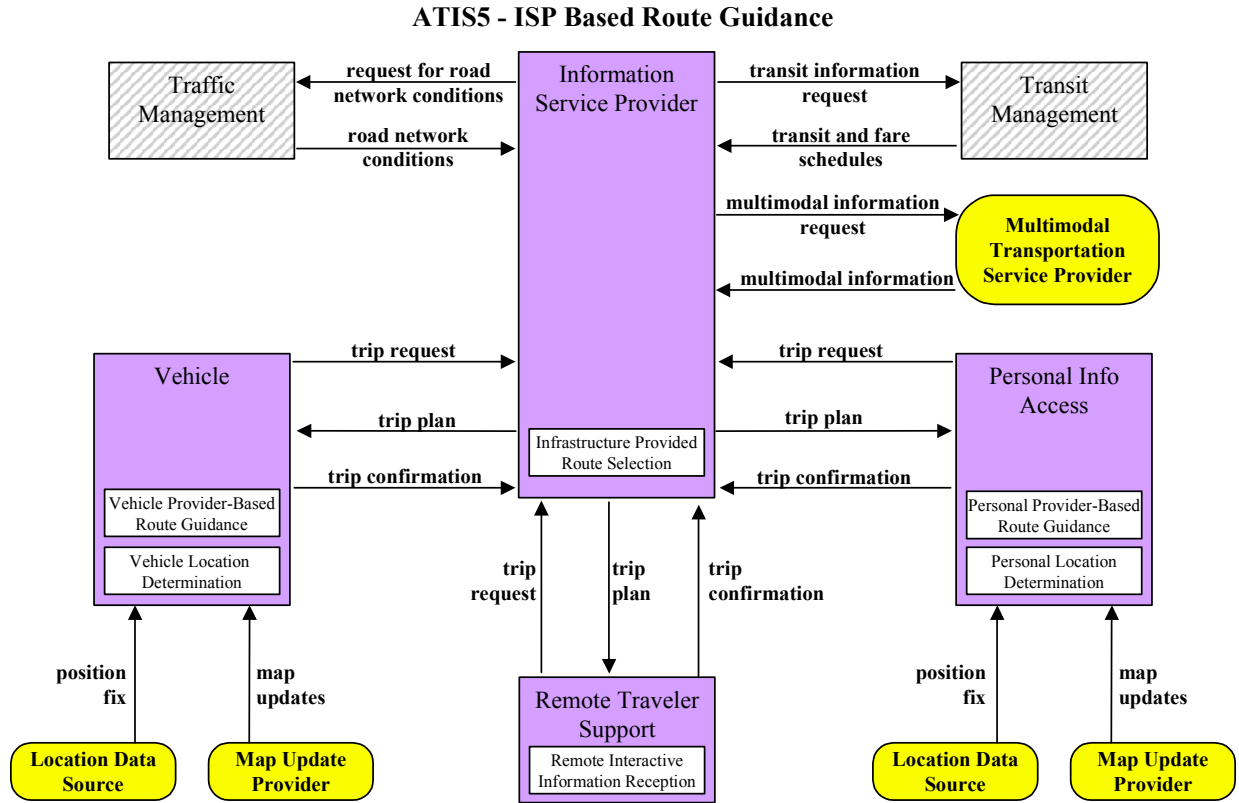
### *Synopsis:*

- Provides pre-trip route planning and turn-by-turn route guidance services.
- Routes based on static information or real time conditions.
- Route determined by Information Service Provider subsystem.

### *Description:*

This market package offers the user pre-trip route planning and turn-by-turn route guidance services. Routes may be based on static information or reflect real time network conditions. Unlike ATIS3 and ATIS4, where the user equipment determines the route, the route determination functions are performed in the Information Service Provider Subsystem in this market package. This approach simplifies the user equipment requirements and can provide the infrastructure better information on which to predict future traffic. The package includes two way data communications and optionally also equips the vehicle with the databases, location determination capability, and display technology to support turn by turn route guidance.

Graphic:



**Examples:**

Satellite communications and GPS are used to gather traveler location data to provide turn-by-turn guidance.

## INTEGRATED TRANSPORTATION MANAGEMENT/ROUTE GUIDANCE (ATIS6)

### *Synopsis:*

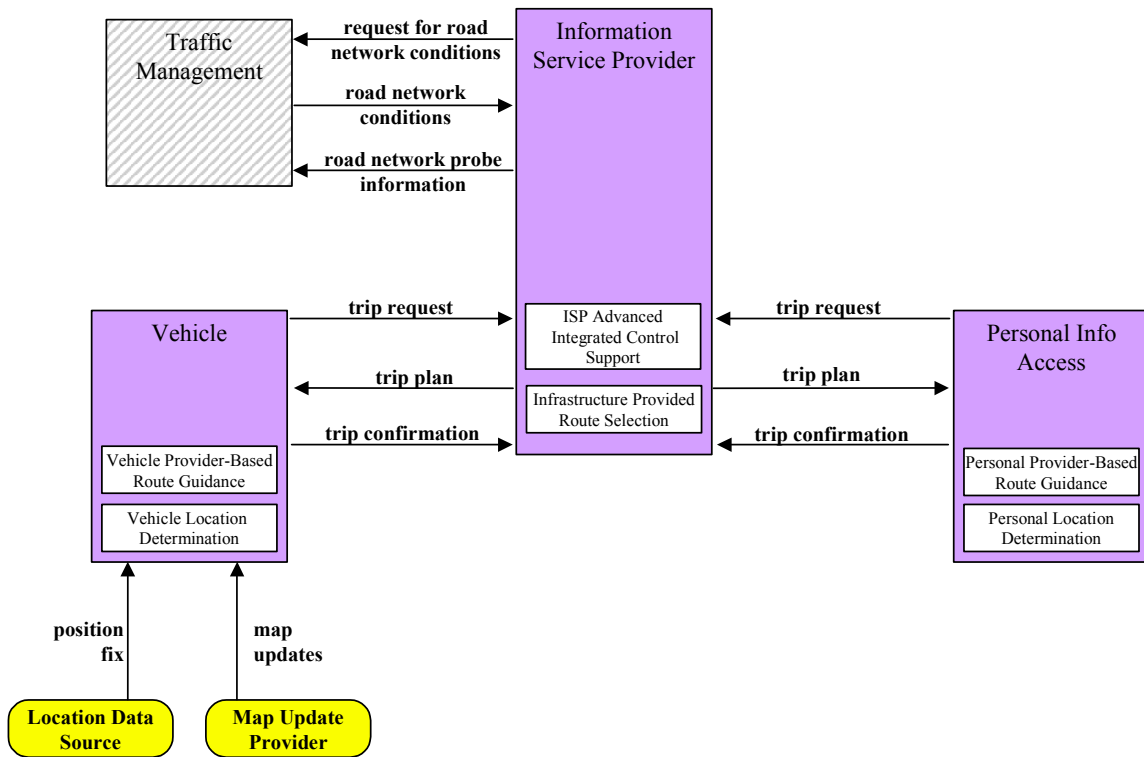
- Provides advanced route planning and guidance which is responsive to current conditions.
- Supports collection of near-real time information on intended routes for vehicles in the network.
- Information can be used by the Traffic Management Subsystem to optimize the traffic control strategy based on anticipated vehicle routes.

### *Description:*

This market package provides advanced route planning and guidance which is responsive to current conditions, and supports collection of near-real time information on intended routes for a proportion of the vehicles in the network. This comprehensive road network probe information can be used by the Traffic Management Subsystem to optimize the traffic control strategy based on anticipated vehicle routes. The Traffic Management Subsystem would utilize the individual and ISP route planning information to optimize signal timing while at the same time providing updated signal timing information to allow optimized route plans. The use of predictive link times for this market package are possible through utilizing the market package ATMS9--Traffic forecast and Demand Management--at the traffic management center.

Graphic:

### ATIS6 - Integrated Transportation Management/Route Guidance



Examples:

Adjust traffic signal timing system based on anticipated usage.

## YELLOW PAGES AND RESERVATION (ATIS7)

### *Synopsis:*

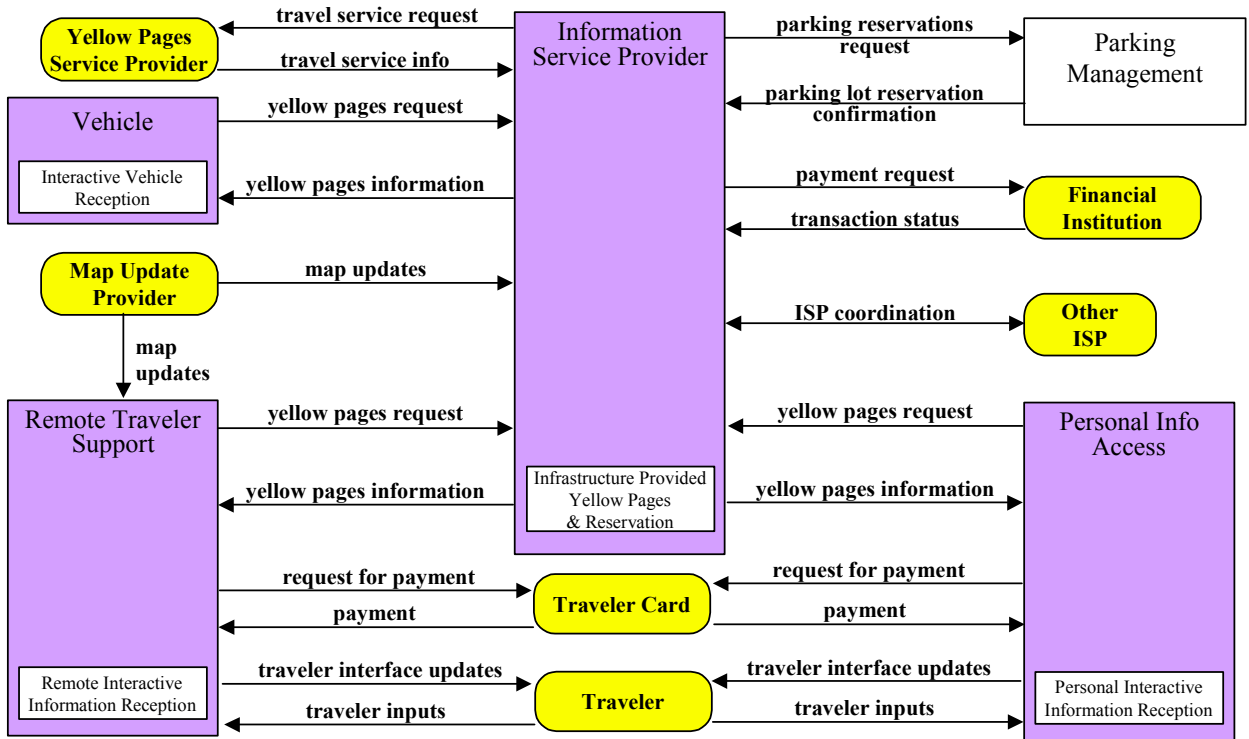
- Enables commercial entities to interactively advertise and accept payment transactions to the traveling public while en-route.
- Allows travelers to obtain a variety of travel related information (lodging, tourism, etc.) from multiple sources.

### *Description:*

This market package provides yellow pages and reservation services to the user. These additional traveler services may be provided using the same basic user equipment used for Interactive Traveler Information. This market package provides multiple ways for accessing information either while en route in a vehicle using wide-area wireless communications or pre-trip via wireline connections.

Graphic:

### ATIS7 - Yellow Pages and Reservation



**Examples:**

While en-route, travelers can obtain information on hotels, restaurants using such devices as telephone, kiosk, PDA, etc.

## IN VEHICLE SIGNING (ATIS9)

### *Synopsis:*

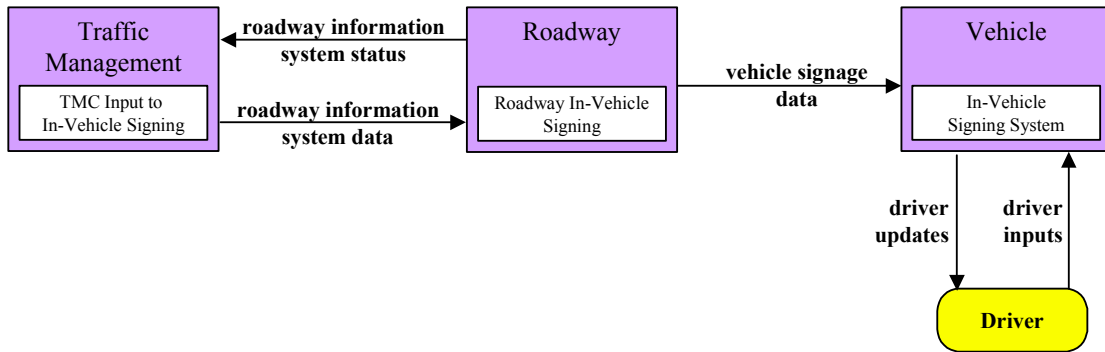
- Allows travelers to obtain real-time and near real-time roadway condition information.
- Enables drivers to obtain other roadway information normally found on physical road signs.

### *Description:*

This market package supports distribution of traffic and travel advisory information to drivers through in-vehicle devices. It includes short range communications between roadside equipment and the vehicle and wireline connections to the Traffic Management Subsystem for coordination and control. This market package also informs the driver of both highway-highway and highway-rail intersection status.

*Graphic:*

### ATIS9 - In Vehicle Signing



*Examples:*

Travelers are notified in their vehicles of a lane closure further down the road. The new safe speed limit of 35 mph is displayed also.





# COMMERCIAL VEHICLE OPERATIONS (CVO) BUNDLE



## COMMERCIAL VEHICLE OPERATIONS



## HAZMAT Management (CVO10)

### *Synopsis:*

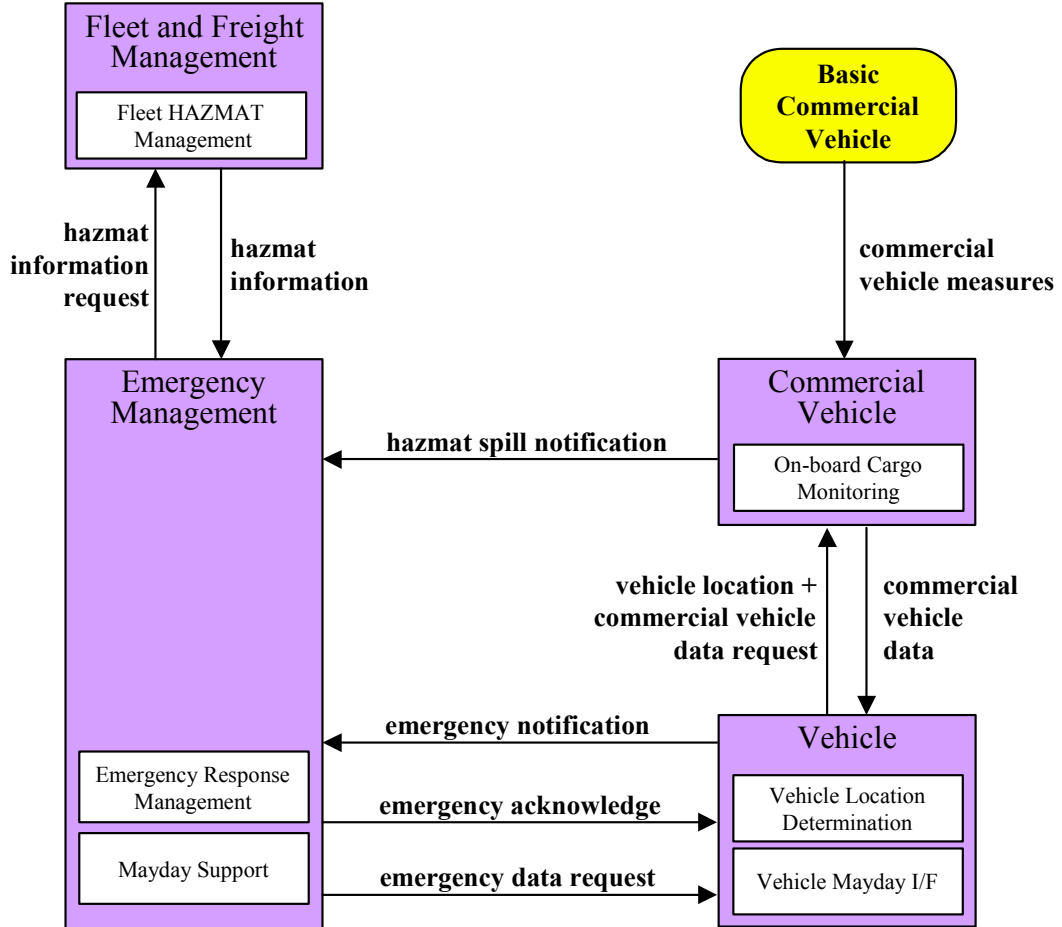
- Integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material.
- HAZMAT loads and routes are registered prior to trip.

### *Description:*

This market package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material and incidents. HAZMAT tracking is performed by the Fleet and Freight Management Subsystem. The Emergency Management subsystem is notified by the Commercial Vehicle if an incident occurs and coordinates the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Subsystem. The latter information can be provided prior to the beginning of the trip or gathered following the incident depending on the selected policy and implementation.

Graphics:

## CVO10 - HAZMAT Management

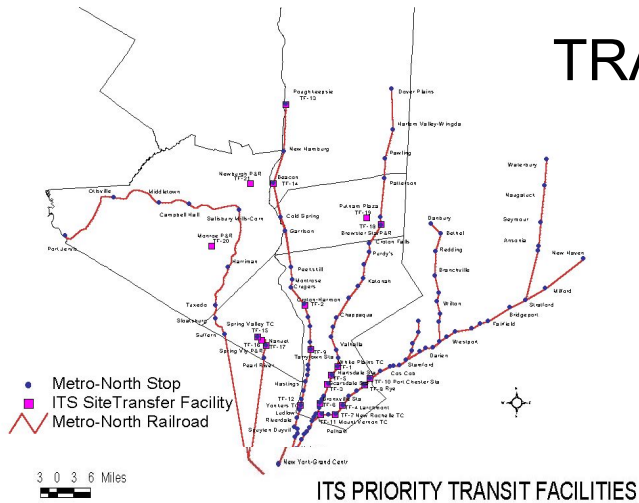


### Examples:

A hazardous materials spill occurs and information concerning the load is registered allowing the correct incident emergency response.

# PUBLIC TRANSPORTATION (APTS) BUNDLE

# PUBLIC TRANSPORTATION



## TRANSIT VEHICLE TRACKING (APTS1)

### *Synopsis:*

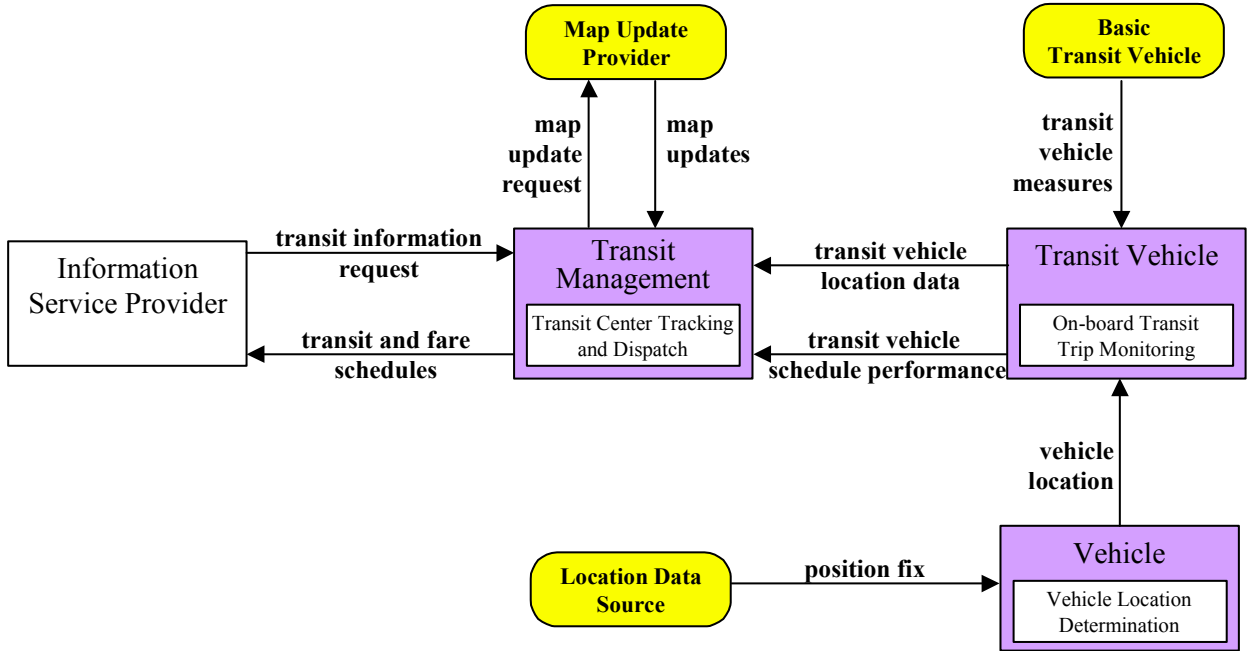
- Monitors current transit vehicle location using an Automated Vehicle Location (AVL) system.
- Used to determine schedule variance.
- Used to update the schedule in real-time.

### *Description:*

This market package monitors current transit vehicle location using an Automated Vehicle Location System. The location data may be used to determine real time schedule adherence and update the transit system's schedule in real-time. Vehicle position may be determined either by the vehicle (e.g., through GPS) and relayed to the infrastructure or may be determined directly by the communications infrastructure. A two-way wireless communication link with the Transit Management Subsystem is used for relaying vehicle position and control measures. Fixed route transit systems may also employ beacons along the route to enable position determination and facilitate communications with each vehicle at fixed intervals. The Transit Management Subsystem processes this information, updates the transit schedule and makes real-time schedule information available to the Information Service Provider.

Graphics:

### APTS1 - Transit Vehicle Tracking



**Examples:**

System tracks transit vehicles in real-time and passes information to other systems.

## TRANSIT FIXED-ROUTE OPERATIONS (APTS2)

### *Synopsis:*

- Performs vehicle routing and scheduling, automatic driver assignment and system monitoring.
- Determines schedule performance using Automatic Vehicle Location (AVL) data.
- Data is shared with ISPs to provide current transit schedule performance to the public.

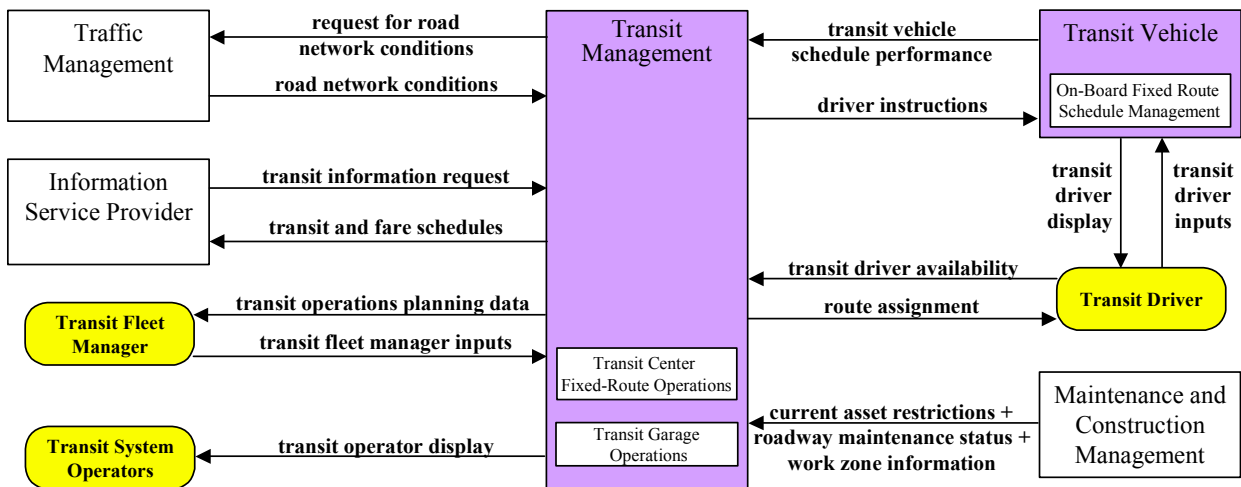
### *Description:*

This market package performs vehicle routing and scheduling, as well as automatic driver assignment and system monitoring for fixed-route transit services. This service determines current schedule performance using AVL data and provides information displays at the Transit Management Subsystem. Static and real time transit data is exchanged with Information Service Providers where it is integrated with that from other transportation modes (e.g. rail, ferry, air) to provide the public with integrated and personalized dynamic schedules.



*Graphic:*

### APTS2 - Transit Fixed-Route Operations



*Examples:*

Automated transit scheduling system.

## DEMAND RESPONSE TRANSIT OPERATIONS (APTS3)

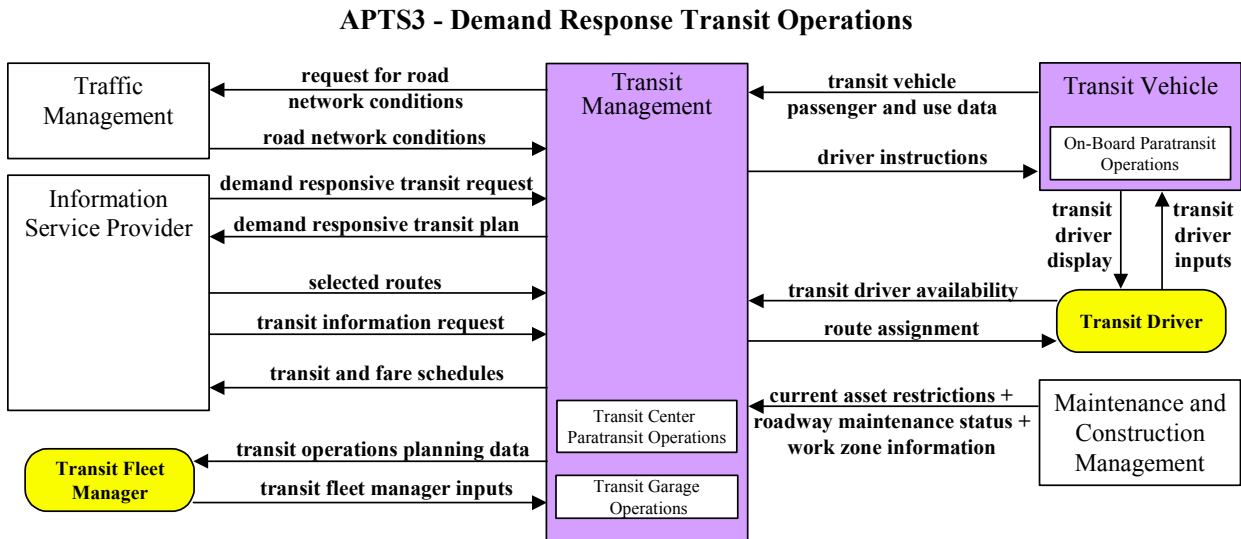
### *Synopsis:*

- Performs vehicle routing and scheduling, automatic driver assignment, and monitoring for demand responsive transit services.
- Allows incoming requests for transit.
- Monitors the current status of the transit fleet to optimize resources.

### *Description:*

This market package performs vehicle routing and scheduling as well as automatic driver assignment and monitoring for demand responsive transit services. This package monitors the current status of the transit fleet and supports allocation of these fleet resources to service incoming requests for transit service while also considering traffic conditions. The Transit Management Subsystem provides the necessary data processing and information display to assist the transit operator in making optimal use of the transit fleet. This service includes the capability for a traveler request for personalized transit services to be made through the Information Service Provider (ISP) Subsystem. The ISP may be either be operated by transit management center or be independently owned and operated by a separate service provider. In the first scenario, the traveler makes a direct request to a specific paratransit service. In the second scenario, a third party service provider determines the paratransit service is a viable means of satisfying a traveler request and makes a reservation for the traveler.

Graphic:



**Examples:**

A traveler makes a request via telephone or web site for a specific para-transit service.

## TRANSIT PASSENGER AND FARE MANAGEMENT (APTS4)

### *Synopsis:*

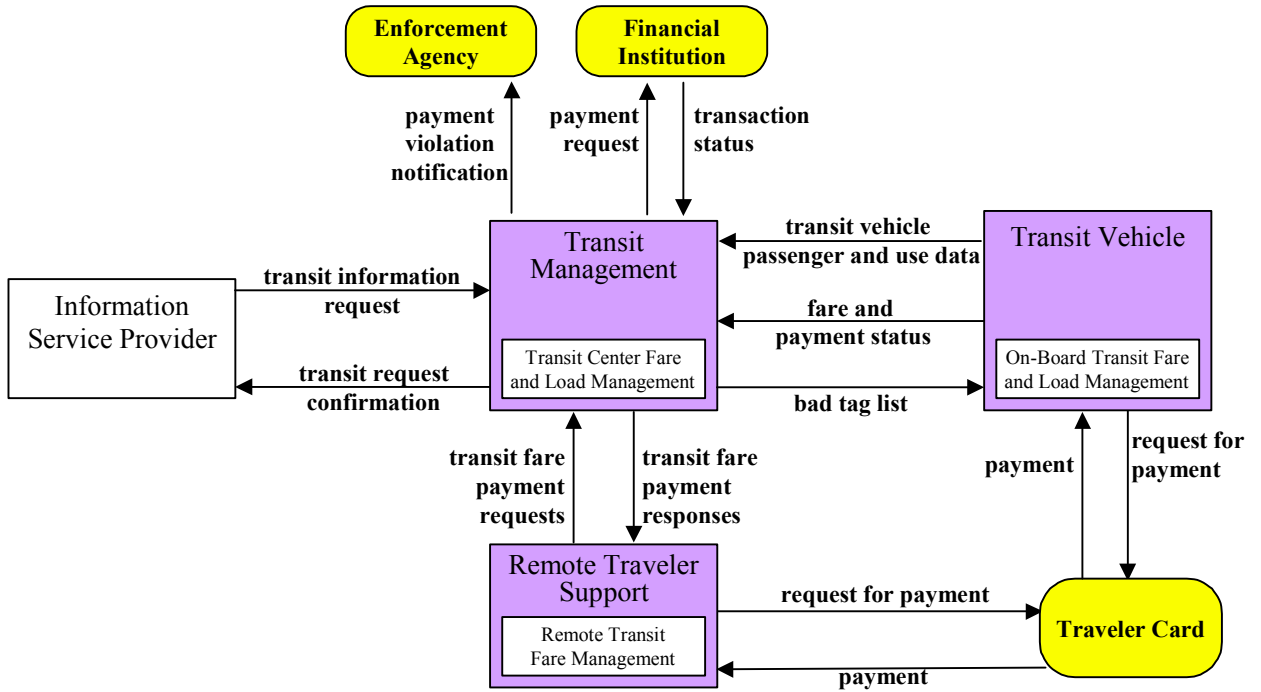
- Monitors passenger loading and fare payments on-board vehicles using electronic systems.
- Allows transit users to use a traveler card or other electronic payment device.

### *Description:*

This market package manages passenger loading and fare payments on-board vehicles using electronic means. It allows transit users to use a traveler card or other electronic payment device. Sensors mounted on the vehicle permit the driver and central operations to determine vehicle loads, and readers located either in the infrastructure or on-board the transit vehicle allow electronic fare payment. Data is processed, stored, and displayed on the transit vehicle and communicated as needed to the Transit Management Subsystem.

Graphic:

### APTS4 - Transit Passenger and Fare Management



**Examples:**

Travelers can use electronic payment device such as a travel card to pay for fare.

## TRANSIT SECURITY (APTS5)

### *Synopsis:*

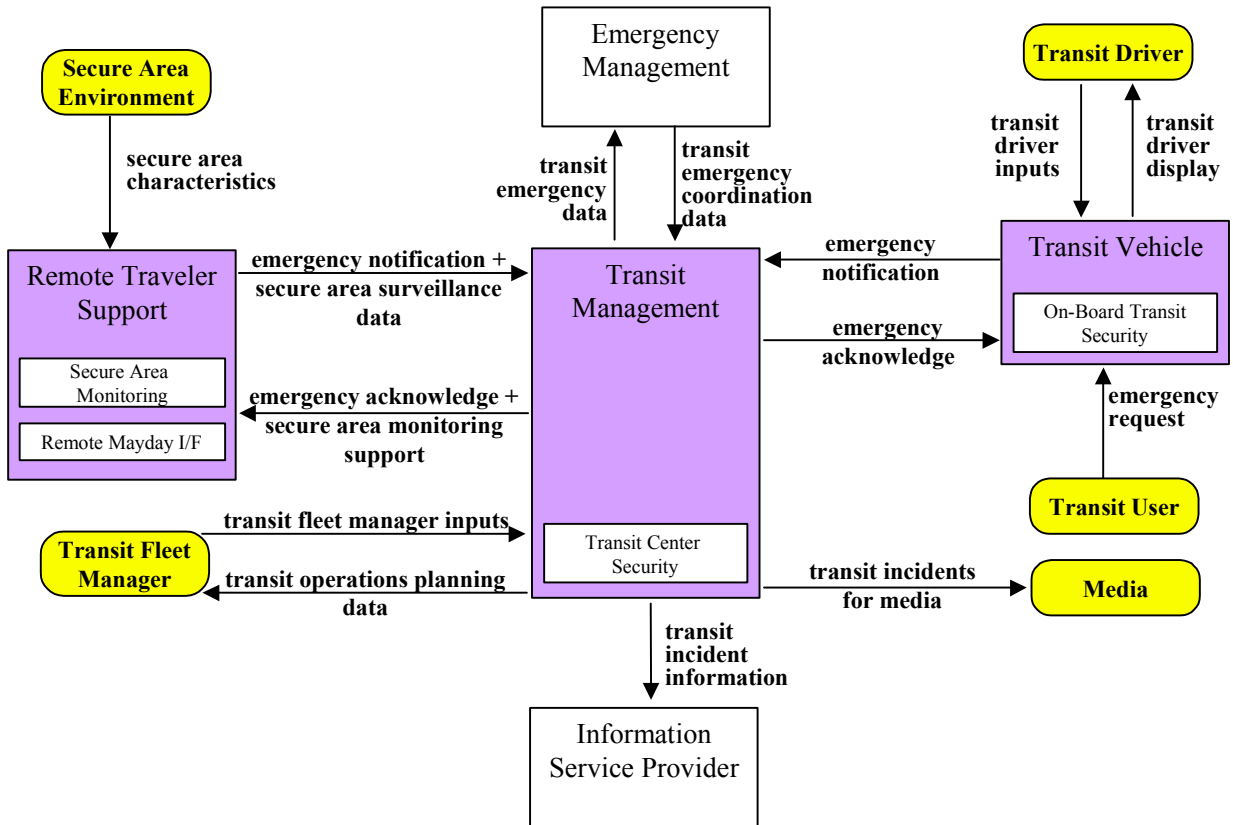
- Provides for the physical security of transit passengers on-board or at public areas using surveillance devices.
- When needed, security related data sent to Emergency Management Subsystem.

### *Description:*

This market package provides for the physical security of transit passengers. An on-board security system is deployed to perform surveillance and warn of potentially hazardous situations. Public areas (e.g. stops, park and ride lots, stations) are also monitored. Information is communicated to the Transit Management Subsystem using the existing or emerging wireless (vehicle to center) or wireline (area to center) infrastructure. Security related information is also transmitted to the Emergency Management Subsystem when an emergency is identified that requires an external response. Incident information is communicated to the Information Service Provider.

Graphic:

### APTS5 - Transit Security



### Examples:

Transit vehicles, stops, park and ride lots, stations and other transit public areas are monitored.

## TRANSIT MAINTENANCE (APTS6)

### *Synopsis:*

- Supports automatic transit maintenance scheduling and monitoring.
- Monitors system status and transmits critical status information to the transit center.

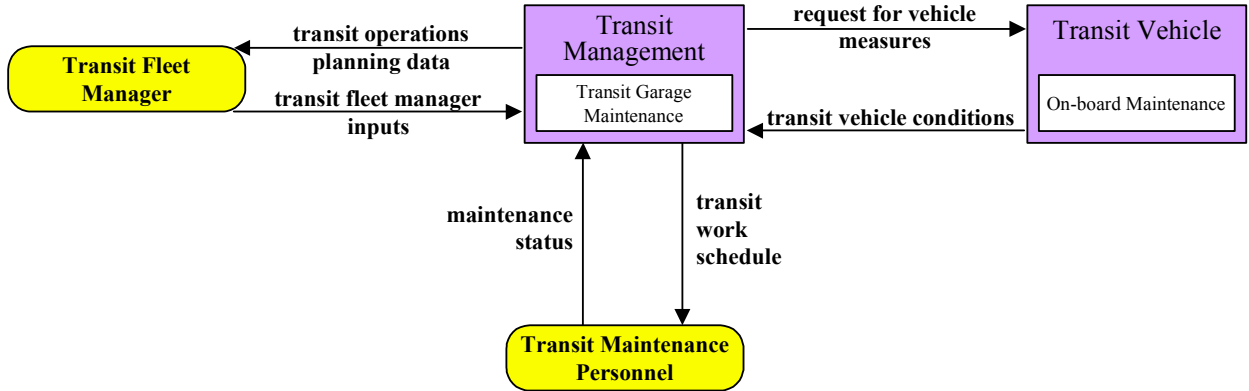
### *Description:*

This market package supports automatic transit maintenance scheduling and monitoring. On-board condition sensors monitor system status and transmit critical status information to the Transit Management Subsystem. Hardware and software in the Transit Management Subsystem processes this data and schedules preventative and corrective maintenance.



*Graphic:*

### APTS6 - Transit Maintenance



*Examples:*

On-board condition sensors notify transit management of maintenance problems with vehicles. Preventative maintenance is scheduled.

## MULTI-MODAL COORDINATION (APTS7)

### *Synopsis:*

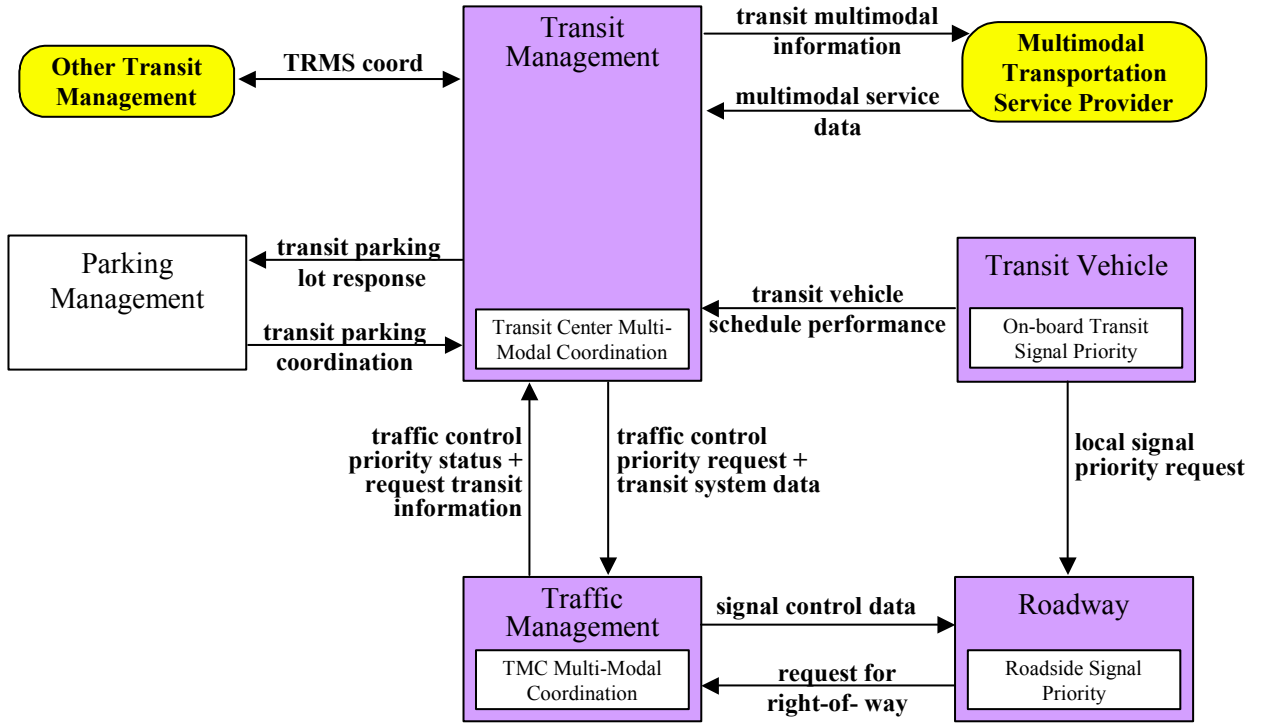
- Establishes two-way communications between multiple transit and traffic agencies to improve service coordination.
- Increases traveler convenience at transfer points.
- Improves operating efficiency.

### *Description:*

This market package establishes two way communications between multiple transit and traffic agencies to improve service coordination. Multimodal coordination between transit agencies can increase traveler convenience at transfer points and also improve operating efficiency. Coordination between traffic and transit management is intended to improve on-time performance of the transit system to the extent that this can be accommodated without degrading overall performance of the traffic network. More limited local coordination between the transit vehicle and the individual intersection for signal priority is also supported by this package.

Graphic:

### APTS7 - Multi-modal Coordination



*Examples:*

Bus and rail on time performance information is used to coordinate scheduling.

## TRANSIT TRAVELER INFORMATION (APTS8)

### *Synopsis:*

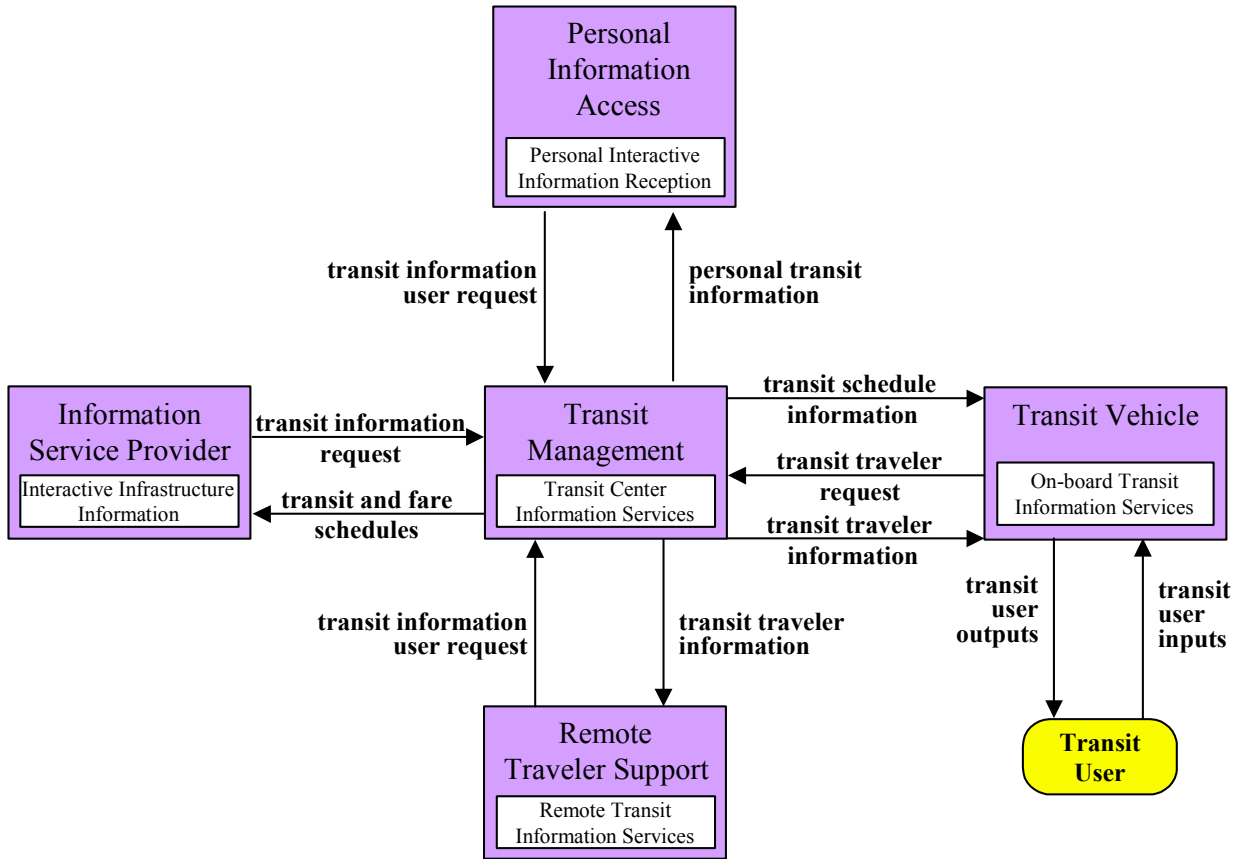
- Provides transit users at transit stops and on-board transit vehicles with ready access to transit information.
- Information communicated via:
  - Transit stop annunciation
  - Imminent arrival signs
  - Real-time transit schedule displays
  - Custom transit trip itineraries

### *Description:*

This market package provides transit users at transit stops and on-board transit vehicles with ready access to transit information. The information services include transit stop annunciation, imminent arrival signs, and real-time transit schedule displays that are of general interest to transit users. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this market package.

Graphic:

### APTS8 - Transit Traveler Information



*Examples:*

Transit stations display “real-time” arrival and other travel related information.

## MAINTENANCE & CONSTRUCTION MANAGEMENT (MC) BUNDLE



# Maintenance and Construction Operations



## MAINTENANCE AND CONSTRUCTION VEHICLE TRACKING (MC01)

### *Synopsis:*

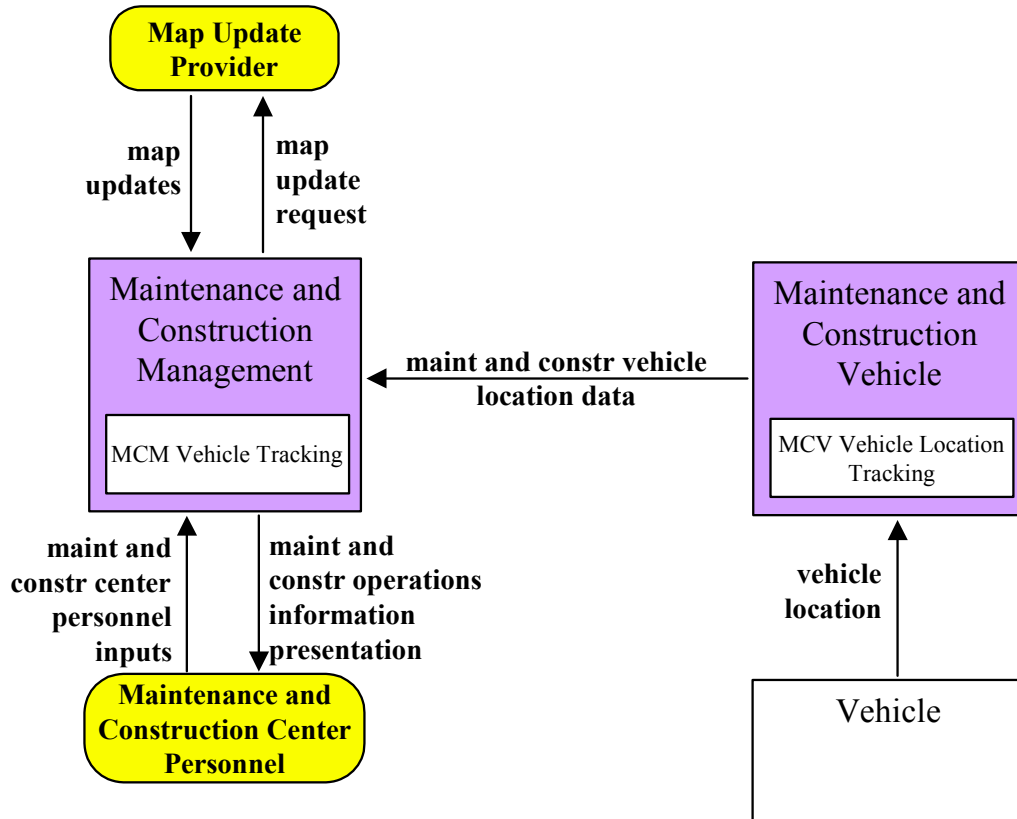
- Track the location of maintenance and construction vehicles and other equipment

### *Description:*

This market package will track the location of maintenance and construction vehicles and other equipment to ascertain the progress of their activities. These activities can include ensuring the correct roads are being plowed and work activity is being performed at the correct locations.

*Graphic:*

## MC01 - Maintenance and Construction Vehicle Tracking



*Examples:*

Monitoring maintenance vehicles to ensure that correct roads are being plowed.



## MAINTENANCE AND CONSTRUCTION VEHICLE MAINTENANCE (MC02)

### *Synopsis:*

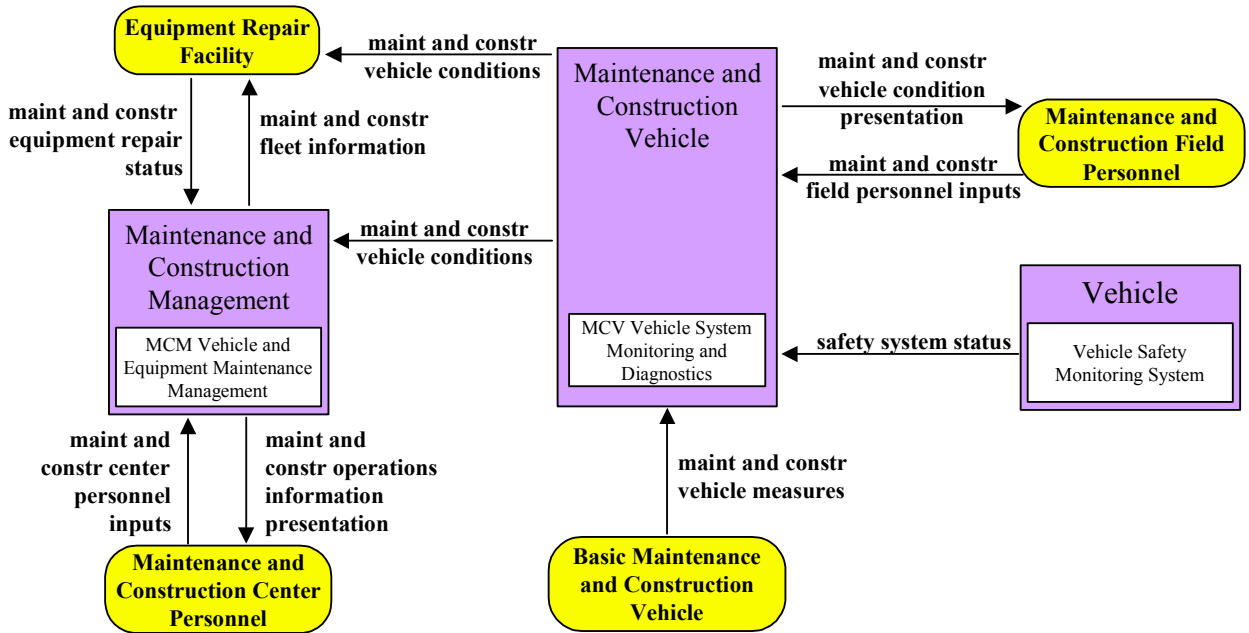
- Performs vehicle maintenance scheduling.
- Manages both routine and corrective maintenance.
- Includes other maintenance and construction equipment.

### *Description:*

This market package performs vehicle maintenance scheduling and manages both routine and corrective maintenance activities on vehicles and other maintenance and construction equipment. It includes on-board sensors capable of automatically performing diagnostics for maintenance and construction vehicles, and the systems that collect this diagnostic information and use it to schedule and manage vehicle maintenance.

Graphic:

### MC02 - Maintenance and Construction Vehicle Maintenance



Examples:

On-board sensors automatically perform diagnostics to schedule and manage vehicle maintenance.

## ROAD WEATHER DATA COLLECTION (MC03)

### *Synopsis:*

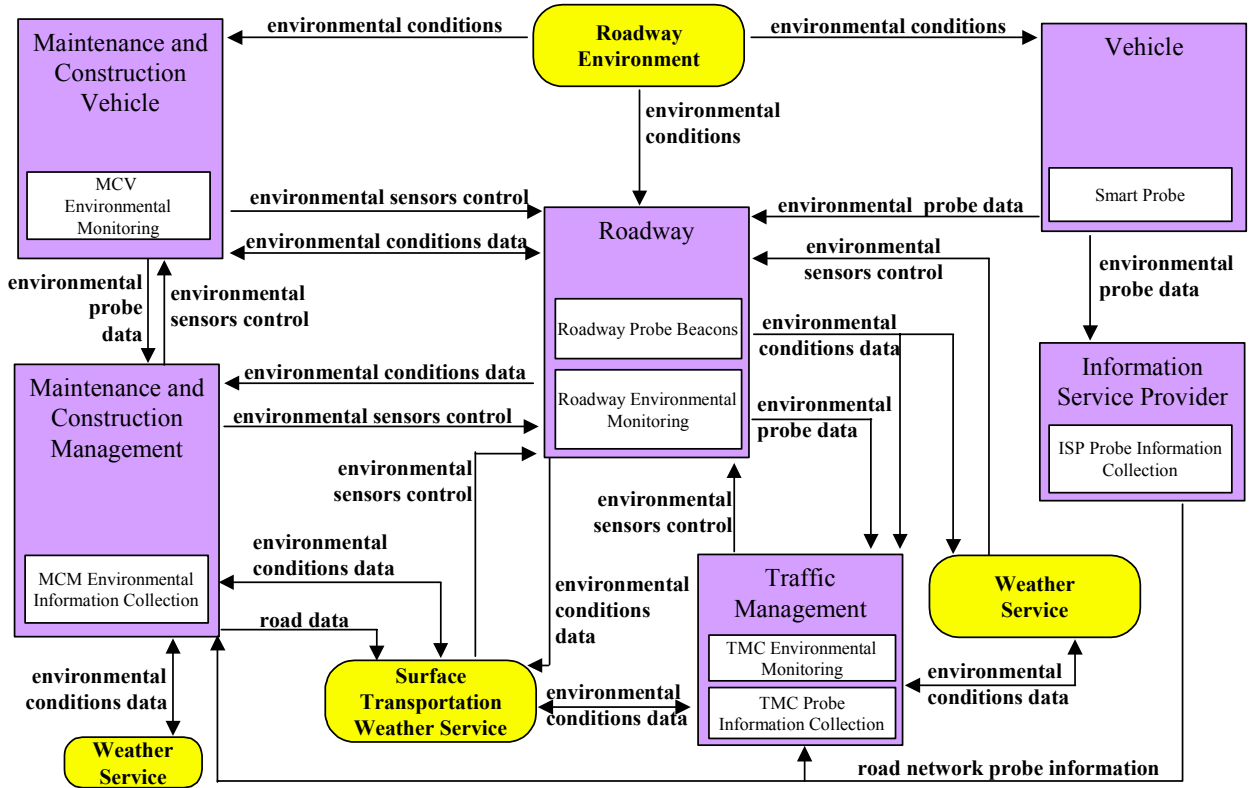
- Collects current road and weather conditions using sensors.
- Sensor systems can be
  - Located on or near roadway
  - Located on Maintenance and Construction Vehicles
  - On-board sensors provided by auto manufacturers

### *Description:*

This market package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway (or guideway in the case of transit related rail systems). In addition to fixed sensor stations at the roadside, sensing of the roadway environment can also occur from sensor systems located on Maintenance and Construction Vehicles and on-board sensors provided by auto manufacturers. The collected environmental data is used by the Weather Information Processing and Distribution Market Package to process the information and make decisions on operations.

Graphic:

### MC03 – Road Weather Data Collection



Examples:

RWIS devices deployed on roadway to detect snow and ice conditions.

## WEATHER INFORMATION PROCESSING AND DISTRIBUTION (MC04)

### *Synopsis:*

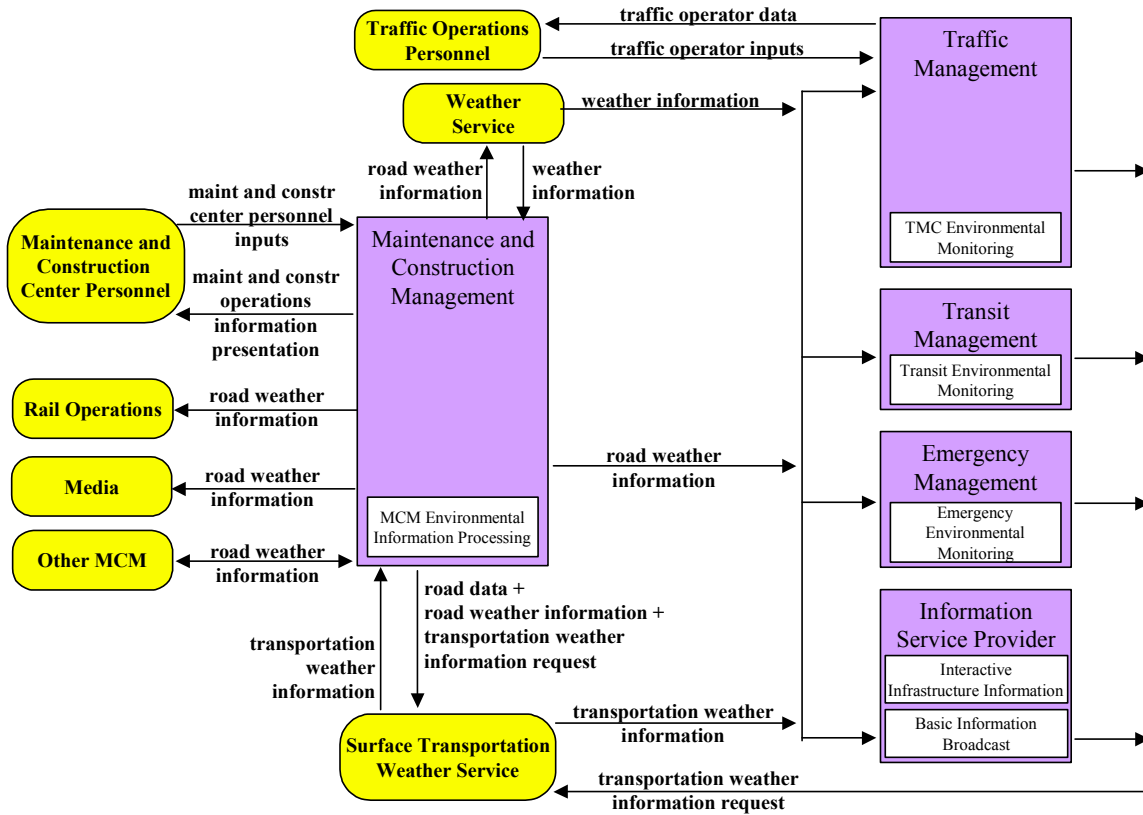
- Processes and distributes the environmental information collected from road weather sensors.
- Determines environmental hazards.
- System operators and decision support systems can take corrective actions.

### *Description:*

This market package processes and distributes the environmental information collected from the Road Weather Data Collection market package. This market package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so system operators and decision support systems can make decision on corrective actions to take. The continuing updates of road condition information and current temperatures can be used by system operators to more effectively deploy road maintenance resources, issue general traveler advisories, issue location specific warnings to drivers using the Traffic Information Dissemination market package, and aid operators in scheduling work activity.

Graphic:

### MC04 - Weather Information Processing and Distribution



*Examples:*

High winds, low temperature and moisture on the road is determined to cause possible ice so maintenance resources (salt trucks) are deployed and traveler advisories are disseminated.

## WINTER MAINTENANCE (MC06)

### *Synopsis:*

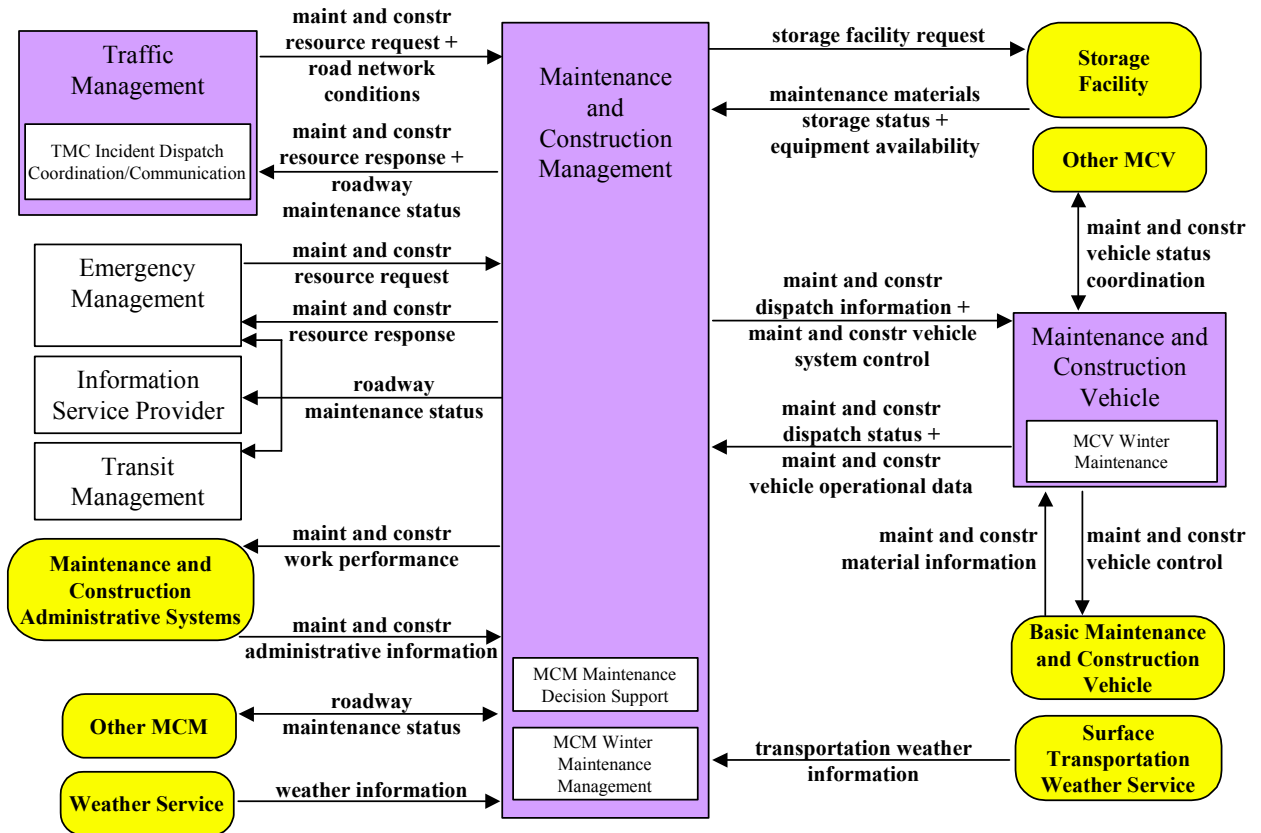
- Supports winter road maintenance.
- Monitors environmental conditions and weather forecasts.
- Schedules winter maintenance activities.
- Determines the appropriate control response.
- Track and manage response operations.

### *Description:*

This market package supports winter road maintenance including snow plow operations, roadway treatments (e.g., salt spraying and other anti-icing material applications), and other snow and ice control activities. This package monitors environmental conditions and weather forecasts and uses the information to schedule winter maintenance activities, determine the appropriate snow and ice control response, and track and manage response operations.

Graphic:

### MC06 - Winter Maintenance



Examples:

Salt spraying and other anti-icing material applications are scheduled and tracked.



## ROADWAY MAINTENANCE AND CONSTRUCTION (MC07)

### *Synopsis:*

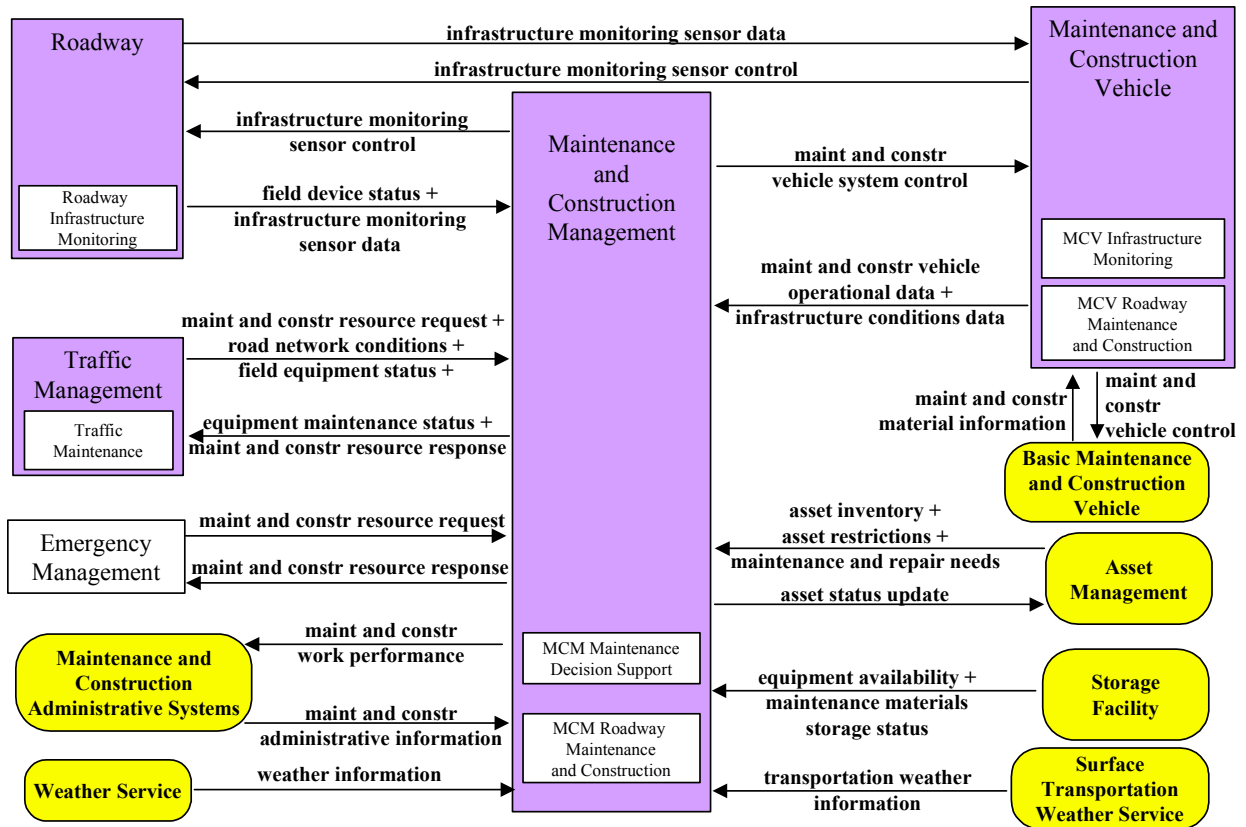
- Supports scheduled and unscheduled maintenance.
- Maintenance activities can include:
  - Debris and dead animal removal
  - Grass cutting
  - Repair of roadside equipment

### *Description:*

This market package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way. Maintenance services would include landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, CCTV, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling maintenance and construction activities.

Graphic:

### MC07 - Roadway Maintenance and Construction



Examples:

Request received for pickup of a muffler on the shoulder. Scheduled grass cutting in the median.

## WORK ZONE MANAGEMENT (MC08)

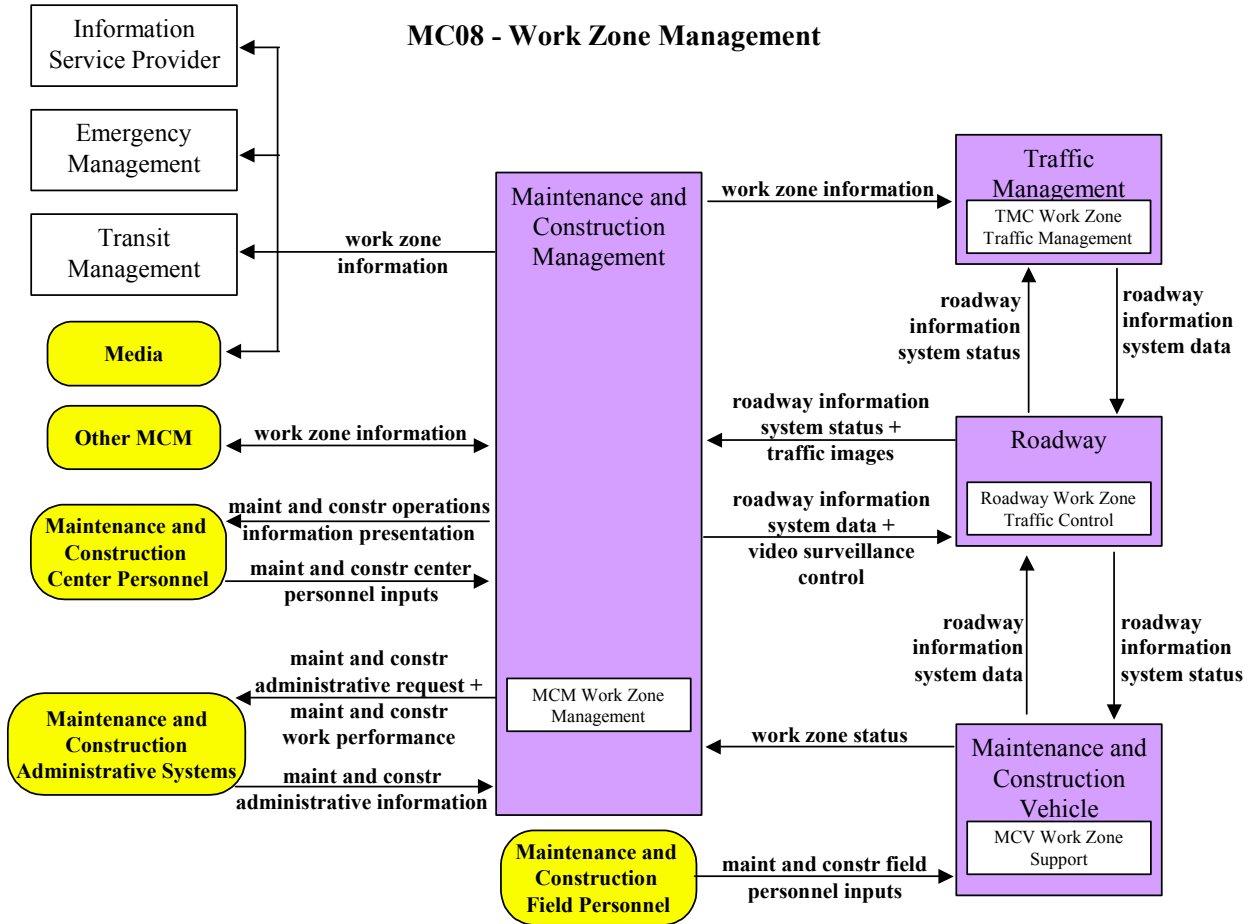
### *Synopsis:*

- Directs activity in work zones, controls traffic, and informs other agencies of activity.
- Work zone speeds and delays are provided to the motorist prior to the work zones.

### *Description:*

This market package directs activity in work zones, controlling traffic through portable dynamic message signs (DMS) and informing other groups of activity (e.g., ISP, TM, other maintenance and construction centers) for better coordination management. Work zone speeds and delays are provided to the motorist prior to the work zones.

*Graphic:*



*Examples:*

Portable Dynamic Message Signs (DMS) display messages concerning road work in progress ahead on the highway.

## WORK ZONE SAFETY MONITORING (MC09)

### *Synopsis:*

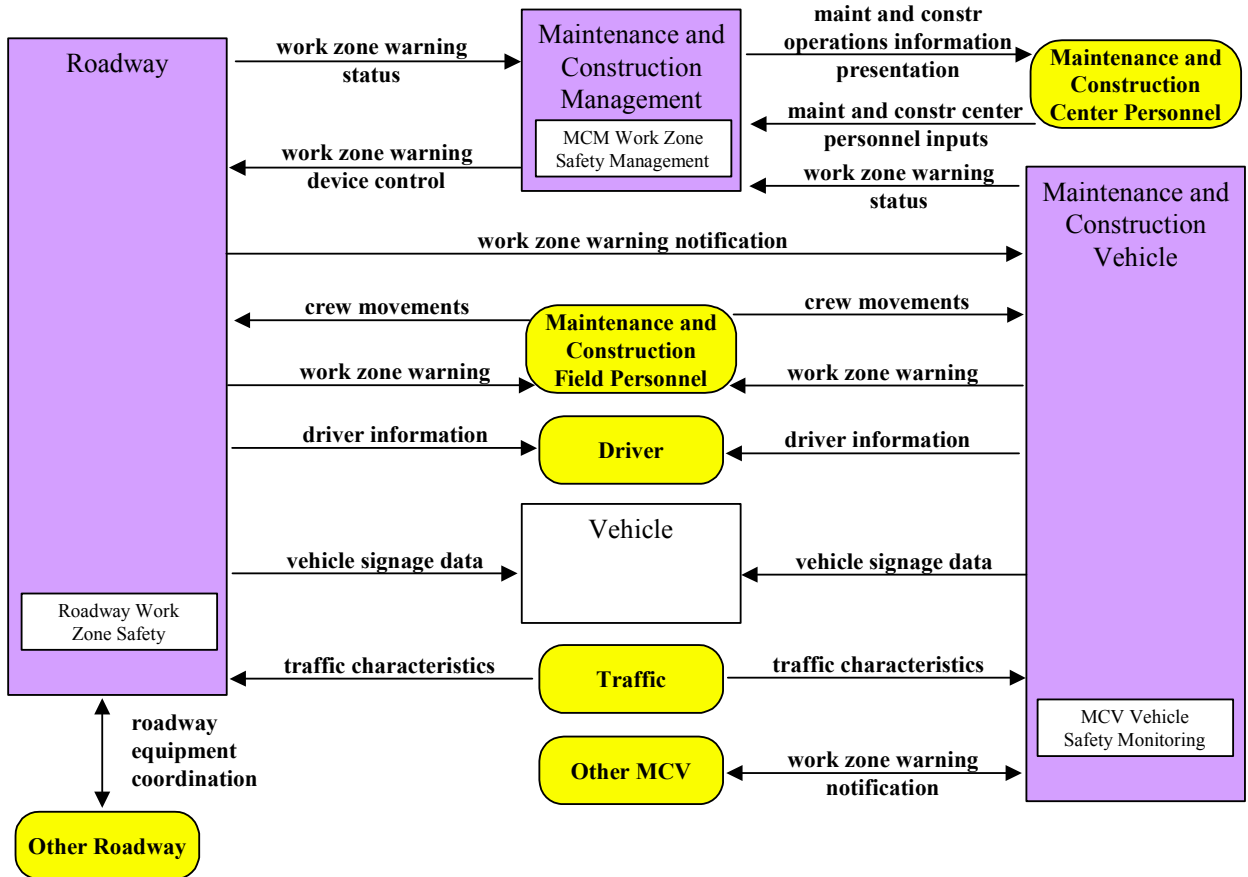
- Improve work crew safety.
- Reduces collisions between the motoring public and maintenance and construction vehicles.
- Detects vehicle intrusions in work zones.
- Warns crew and drivers of imminent encroachment or safety hazards.
- Monitors crew movements outside of work zone.

### *Description:*

This market package includes systems that improve work crew safety and reduce collisions between the motoring public and maintenance and construction vehicles. This market package detects vehicle intrusions in work zones and warns crew workers and drivers of imminent encroachment or other potential safety hazards. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone. The market package supports both stationary and mobile work zones. The intrusion detection and alarm systems may be collocated or distributed, allowing systems that detect safety issues far upstream from a work zone (e.g., detection of over-dimension vehicles before they enter the work zone).

Graphic:

### MC09 - Work Zone Safety Monitoring



**Examples:**

An intrusion detection and alarm system determines that an oversized vehicle is entering a temporary lane.

## MAINTENANCE AND CONSTRUCTION ACTIVITY COORDINATION (MC10)

### *Synopsis:*

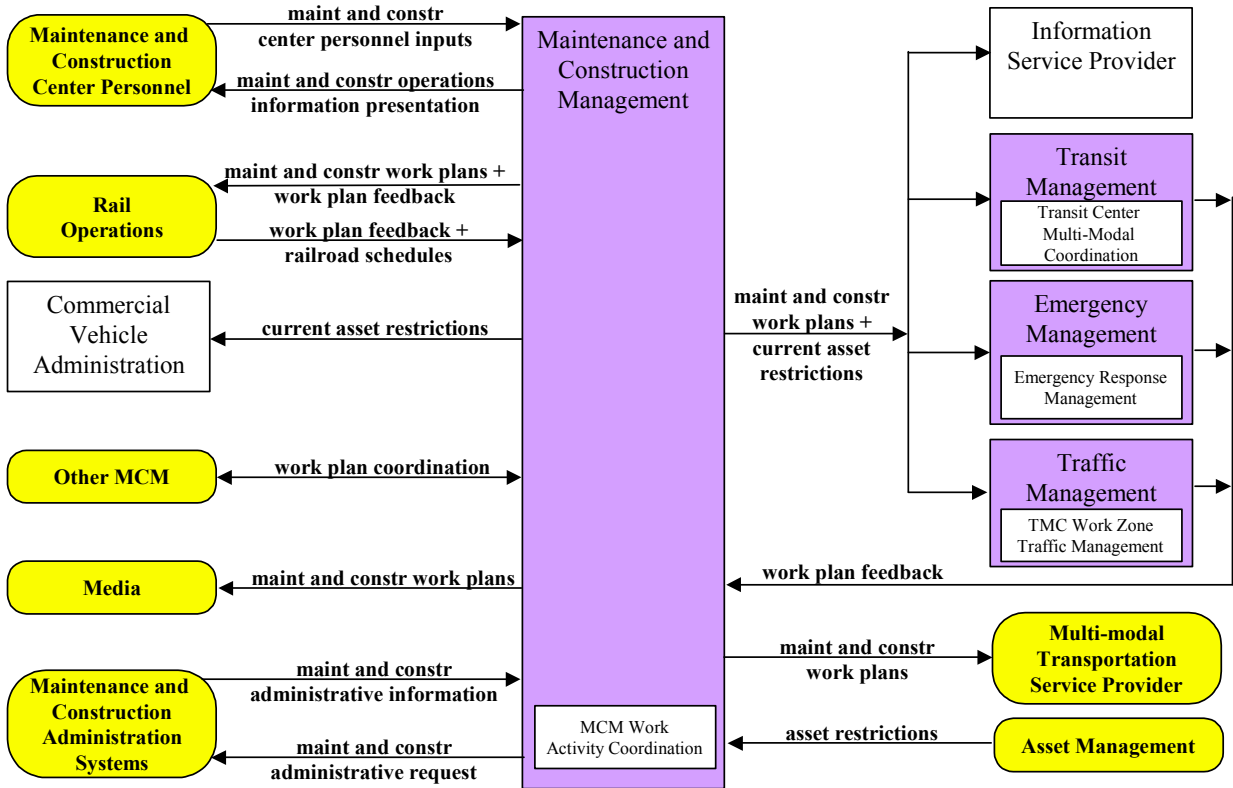
- Disseminates maintenance and construction activity to:
  - Other centers for operations
  - Information Service Providers for travelers

### *Description:*

This market package supports the dissemination of maintenance and construction activity to centers which can utilize it as part of their operations, or to the Information Service Providers who can provide the information to travelers.

*Graphic:*

**MC10 - Maintenance and Construction Activity Coordination**



*Examples:*

Automated communications between state DOT and local agencies concerning maintenance activities.



**APPENDIX E**  
**ACROYNM LIST**

## NYSDOT Region 8 Acronym List

| Acronym     | Definition   |
|-------------|--|
| Bee-Line    | Westchester County Bus System  |
| CVIEW       | Statewide Commercial Vehicle Information Exchange Window   |
| IEN         | Information Exchange Network – Data network for information exchange between I-95 Coalition members        |
| IRVN        | Interagency Remote Video Network from Transcom   |
| LOOP Bus    | Dutchess County Bus System   |
| Metro North | Commuter Rail System from New York City serving Westchester, Putnam and lower section of Dutchess Counties |
| MTA         | Metropolitan Transit Authority   |
| NYMTC       | New York Metropolitan Transportation Council   |
| NYSBA       | New York State Bridge Authority  |
| NYSDOT      | New York State Department Of Transportation  |
| MAMIS       | Maintenance and Management Information System  |
| NYSP        | New York State Police  |
| NYSTA       | New York State Thruway Authority   |
| SATIN       | Service Area Travelers Interactive Network   |
| TOR Bus     | Rockland County Bus System (Transportation of Rockland- TOR)   |

## National ITS Architecture Acronym List

| Acronym       | Definition  |
|---------------|---|
| <b>AASHTO</b> | American Association of State Highway and Transportation Officials      |
| <b>ABS</b>    | Antilock Brake System   |
| <b>AD</b>     | Archived Data   |
| <b>ADA</b>    | Americans with Disabilities Act   |
| <b>ADMS</b>   | Archived Data Management Subsystem                                      |
| <b>ADUS</b>   | Archived Data User Service  |
| <b>AFD</b>    | Architecture Flow Diagram   |
| <b>AHS</b>    | Automated Highway System  |
| <b>AID</b>    | Architecture Interconnect Diagram                                       |
| <b>AMPS</b>   | Advanced Mobile Phone System  |
| <b>ANSI</b>   | American National Standards Institute                                   |
| <b>APTS</b>   | Advanced Public Transportation System                                   |
| <b>ASP</b>    | Application Service Provider  |
| <b>ASTM</b>   | American Society for Testing and Materials                              |
| <b>ATC</b>    | Automatic Train Control, Advanced Transportation Controller             |
| <b>ATIS</b>   | Advanced Traveler Information System                                    |
| <b>ATM</b>    | Asynchronous Transfer Mode  |
| <b>ATMS</b>   | Advanced Traffic Management System                                      |
| <b>AVCS</b>   | Advanced Vehicle Control System   |
| <b>AVI</b>    | Automated Vehicle Identification  |
| <b>AVL</b>    | Automated Vehicle Location  |
| <b>AVO</b>    | Automated Vehicle Operation   |
| <b>CAA</b>    | Clean Air Act   |
| <b>CASE</b>   | Computer Aided Systems Engineering, Computer Aided Software Engineering |
| <b>CCTV</b>   | Closed Circuit TV   |
| <b>CD</b>     | Compact Disc  |
| <b>CDMA</b>   | Code Division Multiple Access   |
| <b>CDPD</b>   | Cellular Digital Packet Data  |

|               |   |
|---------------|---|
| <b>CD-ROM</b> | CD Read Only Memory                                   |
| <b>CMS</b>    | Changeable Message Sign, Congestion Management System |
| <b>COTR</b>   | Contracting Officer Technical Representative          |
| <b>CSP</b>    | Communication Service Provider                        |
| <b>CV</b>     | Commercial Vehicle                                    |
| <b>CVAS</b>   | Commercial Vehicle Administration Subsystem           |
| <b>CVCS</b>   | Commercial Vehicle Check Subsystem                    |
| <b>CVISN</b>  | Commercial Vehicle Information Systems and Networks   |
| <b>CVO</b>    | Commercial Vehicle Operations                         |
| <b>CVS</b>    | Commercial Vehicle Subsystem                          |
| <b>DAB</b>    | Digital Audio Broadcast                               |
| <b>DC</b>     | Double Click (or District of Columbia)                |
| <b>DD</b>     | Data Dictionary                                       |
| <b>DDE</b>    | Data Dictionary Element                               |
| <b>DFD</b>    | Data Flow Diagram                                     |
| <b>DGPS</b>   | Differential Global Positioning System                |
| <b>DMS</b>    | Dynamic Message Sign                                  |
| <b>DMV</b>    | Department of Motor Vehicles                          |
| <b>DOD</b>    | Department of Defense                                 |
| <b>DOT</b>    | Department of Transportation                          |
| <b>DSRC</b>   | Dedicated Short Range Communications                  |
| <b>DTA</b>    | Dynamic Traffic Assignment                            |
| <b>DVD</b>    | Digital Video Disc                                    |
| <b>E9-1-1</b> | Enhanced 9-1-1  |
| <b>ECPA</b>   | Electronic Communications Privacy Act                 |
| <b>EDI</b>    | Electronic Data Interchange                           |
| <b>EDP</b>    | Early Deployment Plan                                 |
| <b>EMC</b>    | Emergency Management Center                           |
| <b>EMMS</b>   | Emissions Management Subsystem                        |
| <b>EMS</b>    | Emergency Management Subsystem                        |
| <b>EPA</b>    | Environmental Protection Agency                       |
| <b>ESMR</b>   | Enhanced SMR  |

|               |   |
|---------------|---|
| <b>ETA</b>    | Expected Time of Arrival                                |
| <b>ETS</b>    | Emergency Telephone Services                            |
| <b>ETTM</b>   | Electronic Toll and Traffic Management                  |
| <b>EVS</b>    | Emergency Vehicle Subsystem                             |
| <b>FARS</b>   | Fatal Accident Reporting System                         |
| <b>FCC</b>    | Federal Communications Commission for the U.S.          |
| <b>FHWA</b>   | Federal Highway Administration                          |
| <b>FIPS</b>   | Federal Information Processing Standard                 |
| <b>FMC</b>    | Freeway Management Center                               |
| <b>FMCSA</b>  | Federal Motor Carrier Safety Administration             |
| <b>FMS</b>    | Fleet and Freight Management Subsystem                  |
| <b>FOT</b>    | Field Operational Test                                  |
| <b>FPR</b>    | Final Program Review                                    |
| <b>FTA</b>    | Federal Transit Administration                          |
| <b>FTP</b>    | File Transfer Protocol                                  |
| <b>GIS</b>    | Geographic Information System                           |
| <b>GPS</b>    | Global Positioning System                               |
| <b>HAR</b>    | Highway Advisory Radio                                  |
| <b>HAZMAT</b> | HAZardous MATerial(s)                                   |
| <b>HOV</b>    | High Occupancy Vehicle                                  |
| <b>HRI</b>    | Highway Rail Intersection                               |
| <b>HSR</b>    | High Speed Rail   |
| <b>HTF</b>    | Highway Trust Fund                                      |
| <b>HTML</b>   | Hypertext Markup Language                               |
| <b>HTTP</b>   | Hypertext Transfer Protocol                             |
| <b>HUD</b>    | Head-Up Display   |
| <b>IBC</b>    | International Border Clearance                          |
| <b>IEEE</b>   | Institute of Electrical and Electronics Engineers, Inc. |
| <b>IFB</b>    | Invitation for Bid                                      |
| <b>IP</b>     | Internet Protocol                                       |
| <b>IPR</b>    | Interim Program Review                                  |
| <b>ISO</b>    | International Standards Organization                    |

|              |  |
|--------------|--|
| <b>ISP</b>   | Information Service Provider                                       |
| <b>ISTEA</b> | Intermodal Surface Transportation Efficiency Act                   |
| <b>ITE</b>   | Institute of Transportation Engineers                              |
| <b>ITI</b>   | Intelligent Transportation Infrastructure                          |
| <b>ITS</b>   | Intelligent Transportation Systems                                 |
| <b>ITS-A</b> | Intelligent Transportation Society of America                      |
| <b>IVHS</b>  | Intelligent Vehicle Highway Systems                                |
| <b>IVIS</b>  | In-Vehicle Information System                                      |
| <b>JPO</b>   | Joint Program Office   |
| <b>LAN</b>   | Local Area Network   |
| <b>LCD</b>   | Liquid Crystal Display   |
| <b>LED</b>   | Light Emitting Diode   |
| <b>LEO</b>   | Low-Earth Orbit satellite system                                   |
| <b>LPD</b>   | Liability and Property Damage                                      |
| <b>LRMS</b>  | Location Reference Messaging Standard                              |
| <b>MAN</b>   | Metropolitan Area Network  |
| <b>MCMS</b>  | Maintenance and Construction Subsystem                             |
| <b>MCO</b>   | Maintenance and Construction Operations                            |
| <b>MCVS</b>  | Maintenance and Construction Vehicle Subsystem                     |
| <b>MDI</b>   | Model Deployment Initiative  |
| <b>MMDI</b>  | Metropolitan MDI   |
| <b>MMI</b>   | Man-Machine Interface (or Interaction)                             |
| <b>MOE</b>   | Measure Of Effectiveness   |
| <b>MOU</b>   | Memorandum of Understanding  |
| <b>MPA</b>   | Metropolitan Planning Area   |
| <b>MPH</b>   | Miles per Hour   |
| <b>MPO</b>   | Metropolitan Planning Organization                                 |
| <b>NAV</b>   | Navigation   |
| <b>NEMA</b>  | National Electrical Manufacturers Association                      |
| <b>NHPN</b>  | National Highway Planning Network                                  |
| <b>NHTSA</b> | National Highway Traffic Safety Administration                     |
| <b>NII</b>   | National Information Infrastructure (aka Information Superhighway) |

|                |  |
|----------------|--|
| <b>NPRM</b>    | Notice of Proposed Rule Making                             |
| <b>NTCIP</b>   | National Transportation Communications for ITS Protocol    |
| <b>OEM</b>     | Original Equipment Manufacturer                            |
| <b>OSI</b>     | Open Systems Interconnection                               |
| <b>OTP</b>     | Operational Test Plan                                      |
| <b>PC</b>      | Personal Computer  |
| <b>PCS</b>     | Personal Communications System                             |
| <b>PDA</b>     | Personal Digital Assistant                                 |
| <b>PIAS</b>    | Personal Information Access Subsystem                      |
| <b>PMS</b>     | Parking Management Subsystem                               |
| <b>PSPEC</b>   | Process Specification                                      |
| <b>PSTN</b>    | Public Switched Telephone Network                          |
| <b>PTS</b>     | Positive Train Separation                                  |
| <b>R&amp;D</b> | Research and Development                                   |
| <b>RDS</b>     | Radio Data Systems   |
| <b>RDS-TMC</b> | Radio Data Systems incorporating a Traffic Message Channel |
| <b>RFP</b>     | Request For Proposal                                       |
| <b>RFQ</b>     | Request for Quotation                                      |
| <b>RS</b>      | Roadway Subsystem  |
| <b>RTA</b>     | Regional Transit Authority                                 |
| <b>RTS</b>     | Remote Traveler Support Subsystem                          |
| <b>SAE</b>     | Society of Automotive Engineers                            |
| <b>SC</b>      | Single Click   |
| <b>SDO</b>     | Standards Development Organization                         |
| <b>SIP</b>     | Statewide Implementation Plan                              |
| <b>SMR</b>     | Specialized Mobile Radio                                   |
| <b>SNMP</b>    | Simple Network Management Protocol                         |
| <b>SONET</b>   | Synchronous Optical Network                                |
| <b>SOV</b>     | Single Occupancy Vehicle                                   |
| <b>SOW</b>     | Statement of Work  |
| <b>SQL</b>     | Structured Query Language                                  |

|               |  |
|---------------|--|
| <b>SSR</b>    | Standard Speed Rail                            |
| <b>STIP</b>   | Statewide Transportation Improvement Program   |
| <b>STMF</b>   | Simple Transportation Management Framework     |
| <b>STMP</b>   | Simple Transportation Management Protocol      |
| <b>TAS</b>    | Toll Administration Subsystem                  |
| <b>TCIP</b>   | Transit Communications Interface Profiles      |
| <b>TCP</b>    | Transport Control Protocol                     |
| <b>TCS</b>    | Toll Collection Subsystem                      |
| <b>TDM</b>    | Travel Demand Management                       |
| <b>TDMA</b>   | Time Division Multiple Access                  |
| <b>TEA-21</b> | Transportation Equity Act for the 21st Century |
| <b>TIP</b>    | Transportation Improvement Program             |
| <b>TM</b>     | Traffic Management                             |
| <b>TMA</b>    | Transportation Management Area                 |
| <b>TMC</b>    | Traffic Management Center                      |
| <b>TMDD</b>   | Traffic Management Data Dictionary             |
| <b>TMS</b>    | Traffic Management Subsystem                   |
| <b>TOC</b>    | Traffic Operations Center                      |
| <b>TRB</b>    | Transportation Research Board                  |
| <b>TRMC</b>   | Transit Management Center                      |
| <b>TRMS</b>   | Transit Management Subsystem                   |
| <b>TRT</b>    | Technical Review Team                          |
| <b>TRVS</b>   | Transit Vehicle Subsystem                      |
| <b>UDP</b>    | User Datagram Protocol                         |
| <b>USDOT</b>  | United States Department of Transportation     |
| <b>USR</b>    | User Service Requirement                       |
| <b>VMS</b>    | Variable Message Sign                          |
| <b>VRC</b>    | Vehicle/Roadside Communications                |
| <b>VS</b>     | Vehicle Subsystem                              |
| <b>WAN</b>    | Wide Area Network                              |
| <b>WIM</b>    | Weigh-in Motion                                |
| <b>WWW</b>    | World Wide Web                                 |



# NOTES