Connecticut Department of Transportation

HARTFORD AREA REGIONAL ITS ARCHITECTURE

FINAL REPORT

AUGUST 2004

IBI GROUP

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1. INTRODUCTION

Intelligent Transportation Systems (ITS) are applications of advanced technology in the field of transportation, with the goals of increasing operational efficiency and capacity, improving safety, reducing environmental costs, and enhancing personal mobility. Successful ITS deployment requires an approach to planning, implementation, and operations that emphasizes collaboration between relevant entities and compatibility of individual systems. At the core of this process is a systems architecture that guides the coordination and integration of individual ITS deployment projects. This ITS architecture serves as a framework for deployment, defining the component systems and their interconnections and providing a tool for facilitating institutional relationships within a region.

The Connecticut Department of Transportation (ConnDOT), in association with the Capitol Region Council of Governments (CRCOG), the Central Connecticut Regional Planning Agency (CCRPA), and the Midstate Regional Planning Agency (MRPA), is undertaking the development of a Regional ITS Architecture for the Hartford Area. The consultant team for this work consists of IBI Group, in association with Consensus Systems Technologies Corporation and Howard/Stein-Hudson Associates. This report documents the process and outcome of the development of the Hartford Area Regional ITS Architecture.

1.1 Background

The development of a regional ITS architecture is part of the Federal requirements meant to encourage regional integration of transportation systems. The Transportation Equity Act for the 21st Century (TEA-21), enacted in 1998, promotes integration through a focus on interagency and multimodal coordination, and includes a requirement for ITS projects funded through the highway trust fund (including the mass transit fund) to conform to the National ITS Architecture and applicable standards.

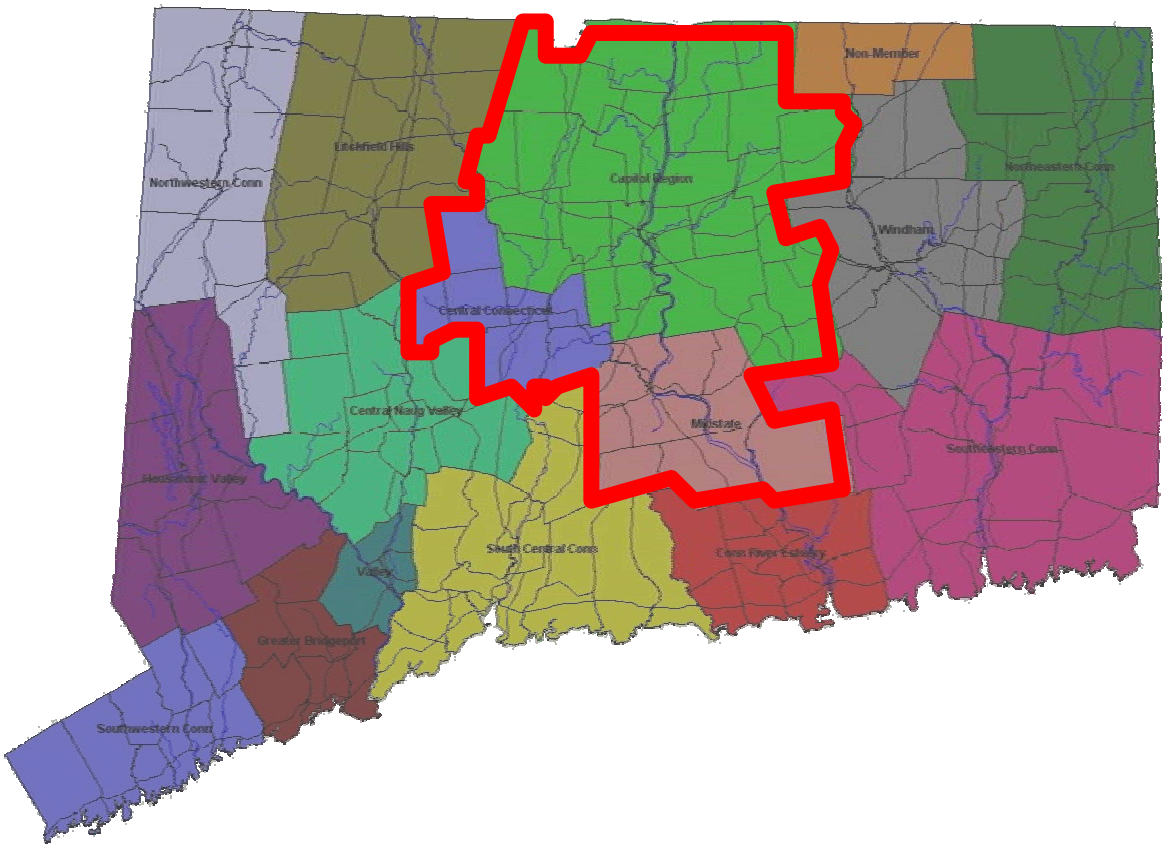
In January 2001, an FHWA Rule and FTA Policy were published that implement the ITS architecture requirement of TEA-21. The Rule/Policy defines conformance with the National ITS Architecture as adherence of ITS projects to a Regional ITS Architecture that is developed based on the National ITS Architecture. For reference, the FHWA rule and FTA policy are attached in Appendices A and B, respectively.

The objectives of the study are based on establishing a framework for integrating transportation systems. Integration will lead to interagency coordination, facilitating communication among transportation and other agencies. The process will also define methods of interagency contacts and formal agreements between agencies. Integration will lead to cost savings, by reducing duplication of effort and encouraging adherence to standards. The ultimate benefits accrue to regional residents from the coordination of agencies engaged in bringing transportation services to the region.

1.2 Definition of the Region

The region covered by the Hartford Area Regional ITS Architecture has been defined to be the area encompassed by the three Regional Planning Agencies in the Hartford area, namely CRCOG, CCRPA, and MRPA. The region is outlined in Exhibit 1-1.

Exhibit 1-1: Hartford Area Study Region



1.3 Organization of the Report

The Final Report presents the process undertaken to develop a framework for a Regional ITS system, leading to the results of the analysis and the recommendations that result from the process. The report is structured as follows:

- Chapter 2 discusses stakeholder involvement in the architecture development process.
- Chapter 3 presents the Needs Assessment.
- Chapter 4 presents the ITS Inventory.
- Chapter 5 discusses the ITS interfaces and the architecture website.
- Chapter 6 presents the Operational Concept.
- Chapter 7 discusses the system functional requirements.
- Chapter 8 presents the Implementation Plan.
- Chapter 9 discusses Operational Agreements.
- Chapter 10 discusses ITS Standards.
- Chapter 11 provides a summary of the report.

2. STAKEHOLDER INVOLVEMENT

The development of a regional ITS architecture requires input and participation of numerous agencies and organizations in order to ensure that the project fully addresses the needs of the region. The agencies and organizations to be involved in this process included those that are involved in planning the region's transportation systems. This section outlines the involvement of key participants in the development process, identifying the participants and their roles and responsibilities.

2.1 Core Project Team

The core project team is made up of ConnDOT, the three RPAs that define the study area (CRCOG, CCRPA, and MRPA), as well as the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA). This core team is responsible for project management, project oversight and direction, as well as review and approval of deliverables from the consultant team.

2.2 Stakeholder Group

The other participants in the architecture development process are the regional ITS stakeholders. These stakeholders include those agencies and organizations involved in surface transportation that own and/or operate ITS elements in the region. These include the following:

- Transit Operators
  - CT Transit
  - Greater Hartford Transit District
  - The Rideshare Company
  - DATTCO
  - Middletown Transit District
  - New Britain Transportation Company
- Municipal Agencies
  - Public Works departments
  - Police departments
  - Fire departments
- State Agencies
  - Department of Public Safety (State Police)
  - Department of Environmental Protection
  - Department of Motor Vehicles

The role of these stakeholders in the architecture development process is to provide input and review. Their involvement in the architecture development process consisted of the following:

- **Initial Stakeholder Meetings**: The purpose of these meetings was to introduce the stakeholders to the project by providing background on the architecture development process, to develop an inventory of ITS elements in the region, and to obtain information on needs, current activities, and planned projects associated with each stakeholder.

- **Architecture Development Workshop**: In this workshop, the stakeholders provided input on the architecture elements and interfaces, building the architecture interactively. The inventory and needs determined in the initial meetings were built on in this step.

- **Review of Draft Architecture Website**: Following the workshop, the stakeholders were given an opportunity to review and comment on the Draft Architecture, which was presented in the form of an interactive website.

- **Draft Final Report Presentation**: Near the end of the project, the project team presented the draft Final Report to the stakeholders, which reflected the input received throughout the architecture development process. The stakeholders had the chance to review the draft report and provide comments.

- **Follow-up Meetings**: Subsequent meetings with individual or groups of stakeholders were held as needed in order to clarify comments and to obtain further information to be incorporated into the report.

3. NEEDS ASSESSMENT

The purpose of the needs assessment is to review the status of existing undertakings initiated by agencies throughout the region. The assessment is based on a review of planning documents or studies and reports that identify regional ITS needs, and ITS efforts that have already been undertaken within the region. The needs assessment is also based on discussions with each of the agencies participating in the overall regional ITS project. Working with these agencies required detailed analysis to determine individual agency needs as well as those needs that are shared by other agencies. The needs for regional ITS were documented through these efforts, which constantly evolved and were refined throughout the course of the study.

3.1 Existing Documentation

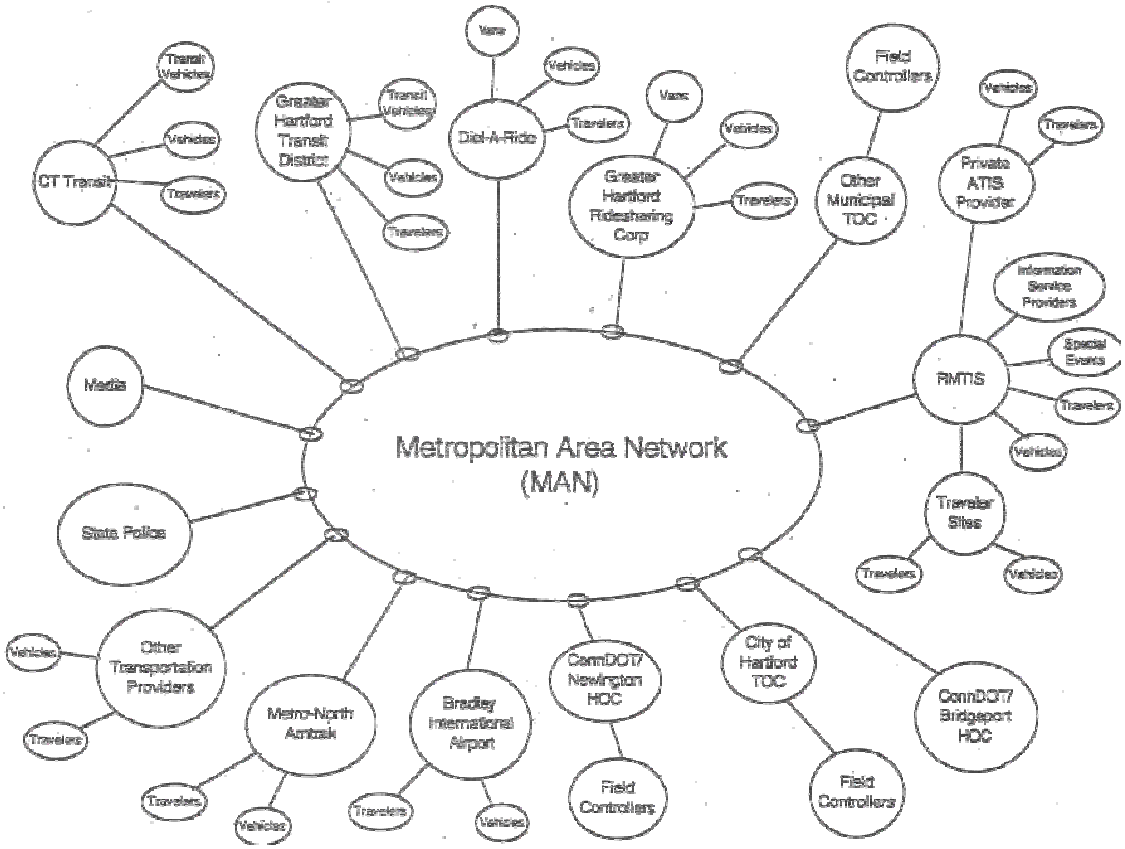
This project builds on a number of previous studies undertaken in the region. The first is an ITS Strategic Plan for the Capitol Region, completed in November 1997. This plan provided recommendations in four areas:

- Travel Information Systems
- Transit & Rideshare Systems
- Highway Management Systems
- Incident Management Systems

These four areas were examined and explored for the Strategic Plan. The four areas were analyzed to develop the ITS Strategic Plan for the Capitol Region which presented a framework for integrating transportation services throughout the Capitol Region.

The recommended architecture configuration is shown in Exhibit 3-1. As the figure illustrates, the plan recommended a peer-to-peer configuration for traffic and transit management functions, communicating via a Metropolitan Area Network. Travel Information functions, however, are consolidated into a centralized travel information system for the region.

Exhibit 3-1: Architecture Recommended by 1997 Strategic Plan



A second study on which this project builds is an ITS Implementation Plan for ConnDOT, completed in June 1999. This plan considers three distinct systems: the Bridgeport Operations Center, the Newington Operations Center, and traffic signal systems statewide. This plan does not address a regional architecture, but instead focuses on project-level architectures for these projects.

Other documentation reviewed included planning documentation from the three RPAs within the study region, such as the Regional Transportation Plans and Transportation Improvement Programs (TIPs).

3.2 Stakeholder Meetings

While existing documentation provides a foundation to start from, the core of the needs assessment task is the individual and group stakeholder meetings. These meetings were key for a number of reasons. First, they were necessary to introduce the stakeholders to the architecture development process. Second, the meetings were used to confirm the preliminary inventory developed from the review of existing documentation and to supplement the inventory to reflect current information. Third, the meetings provided an opportunity to obtain information from the stakeholders about their agency or organization's needs, current activities, and planned projects with relevance to the regional ITS architecture. Finally, the group meetings provided a forum for stakeholders to discuss ITS needs and plans with other stakeholders, providing an opportunity for information exchange.

Exhibit 3-2 presents the meetings that were held as part of the needs analysis. Minutes from these meetings can be found in Appendix C.

Exhibit 3-2: Stakeholder Meetings

Date	Theme / Group	Stakeholders Attending
March 9, 2004	New Britain-Hartford Busway	▪ ConnDOT ▪ Baker Engineering (busway consultant)
March 23, 2004	Greater Hartford Incident Management Steering Committee	▪ Capitol Region Chiefs of Police ▪ Towing and Recovery Professionals of CT ▪ Dept of Environmental Protection ▪ East Hartford Fire Department ▪ ConnDOT ▪ CRCOG ▪ MRPA ▪ CCRPA ▪ FHWA
March 23, 2004	Door-to-Door Transit	▪ Greater Hartford Transit District ▪ Dattco ▪ The Rideshare Company ▪ ConnDOT ▪ CRCOG ▪ FHWA
March 25, 2004	Municipalities	▪ City of Hartford ▪ Town of East Hartford ▪ Town of Manchester ▪ Town of Windsor ▪ ConnDOT ▪ CRCOG ▪ MRPA ▪ CCRPA
March 30, 2004	Fixed-Route Transit	▪ CT Transit ▪ Middletown Transit ▪ New Britain Transportation ▪ City of Bristol ▪ ConnDOT ▪ CRCOG ▪ MRPA ▪ CCRPA
March 30, 2004	CRCOG Emergency Planning Technical Committee	▪ Farmington PD ▪ Hartford PD ▪ Newington PD ▪ Rocky Hill PD ▪ Suffield PD ▪ Vernon PD ▪ ConnDOT ▪ CRCOG

3.3 Regional Needs

Based on the existing documentation that was reviewed, the following issues were identified as key regional needs:

- **Freeway**
  - Expansion of Traffic Management Systems, specifically for this region ConnDOT's system in Newington. Deployment of further field equipment to improve coverage is key.
  - Operational improvements to the roadway network, particularly addressing problem interchanges that have been identified.
  - Capacity improvements to the roadway network, i.e. widening of freeway segments.
- **Arterial**
  - Operational improvements to the roadway network, addressing problem locations identified throughout the region.
  - Expansion of computerized traffic signal control, including replacement of old technology and installation of systems in new locations.
  - Bicycle and pedestrian safety, including new facilities incorporated into the transportation infrastructure.
- **Transit**
  - Improved bus levels of service, including higher frequencies, longer hours of service, more extensive route networks, etc.
  - Improved access to jobs, recognizing changing employment patterns (e.g., reverse and inter-suburb commuters)
  - Improved operational efficiency to make more effective use of existing fleets.
  - Rapid transit service, planned to be addressed through a number of bus rapid transit (BRT) projects.
  - Facilities improvements, including bus stops, shelters, and terminals.
  - Transit-oriented development, encouraging use of public transportation.

In addition, through the initial stakeholder meetings, a number of further needs were identified. These included the following:

- **Better coordination of incident response, especially on highways.** Knowing the location and nature of the incident exactly will allow a quicker response by the proper emergency vehicles. Other concerns include better coordination among responders in the field, as well as police access to the most recent ConnDOT diversion route plans.

- **Transit vehicle tracking.** All of the transit agencies in the region expressed the desire for information on the location of their buses. This information was wanted for operational purposes (e.g., scheduling and dispatching), security purposes (e.g., for hijacked vehicles), and for customer service purposes (e.g., providing real-time information to the public).

- **Roadway information sharing.** ConnDOT and municipalities in the region expressed the desire for roadway conditions from each other. This includes traffic conditions as well as roadway weather information. This information is also desired by transit agencies to support their operations.

- **Transit security.** Security of buses and occupants was a concern expressed by many of the transit agencies. On-board cameras and silent alarms were cited as being useful for this purpose.

- **Centralized transit information.** Although most transit service is provided under the CT Transit name, numerous different transit agencies actually provide the service. This leads to challenges in providing seamless travel information to customers. A centralized portal to transit information was cited as a need that should be addressed.

- **Transit coordination.** The fragmented nature of the transit agencies also points to the need for improved coordination among them. Specific issues cited included full interoperability of fare cards (including a future smart card) as well as operational coordination, such as coordinating transfers, serving paratransit customers with fixed-route transit, and being made aware of service disruptions on other systems.

4. ITS INVENTORY

The ITS inventory was undertaken to determine existing ITS systems in the region, as well as those which individual agencies were planning or investigating. The inventory was based on the information gathered from documentation and from the initial input meetings. This inventory includes existing elements, which are those that are already in place or that have been designed, as well as planned elements that address the needs identified in the needs analysis.

4.1 Inventory by Stakeholder

In the context of the architecture, a stakeholder is any entity that holds or is responsible for an element in the architecture. This includes public agencies that operate or plan transportation systems as well as private organizations that have transportation-related functions. The inventory is presented in Exhibit 4-1 and Exhibit 4-2 with the elements grouped by stakeholder. This shows the elements that belong to each stakeholder in the region.

Exhibit 4-1: ITS Inventory by Stakeholder

Amtrak
- Amtrak Operations Center
- Amtrak Terminal

CCRPA
- CCRPA Traffic Count Database

City of Hartford
- City of Hartford Event Committee
- City of Hartford Website

City of Hartford Fire Department
- City of Hartford Fire Alarms and Signals Division Maintenance Vehicles
- City of Hartford Fire Alarms and Signals Division
- City of Hartford Fire Vehicles

City of Hartford Police Department
- City of Hartford Public Safety Dispatch
- City of Hartford Police Vehicles

City of Hartford Public Works
- City of Hartford Lane Control Signals
- City of Hartford RWIS
- City of Hartford Equipment Repair
- City of Hartford Work Zone Equipment
- City of Hartford Public Works Vehicles
- City of Hartford CCTV
- City of Hartford Vehicle Detectors
- City of Hartford Environmental Sensors
- City of Hartford DMS
- City of Hartford Public Works
- City of Hartford Traffic Signals
- City of Hartford Traffic Operations Center

Commercial Vehicle Operators
- Private Fleet Management Systems
- Commercial Vehicles

ConnDOT
- ConnDOT RWIS Sensors
- ConnDOT DMS / HAR
- ConnDOT Vehicle Detectors
- ConnDOT Web Page
- ConnDOT Work Zone Equipment
- ConnDOT Traffic Signals
- ConnDOT Shop
- ConnDOT 511 System
- ConnDOT TMC Newington
- ConnDOT Maintenance Vehicles
- ConnDOT CCTV
- ConnDOT Ramp Meters
- ConnDOT Anti-Icing Equipment
- ConnDOT TRANSMIT Field Sensors
- ConnDOT HOV Control System
- ConnDOT Public Transportation Management System

ConnDOT (cont'd.)
- ConnDOT CT Statewide Crash Records Database ConnDOT CT Crash Records Database Users
- ConnDOT Park-And-Ride Lots
- ConnDOT Office of Communications
- ConnDOT TMC Bridgeport
- ConnDOT Storm Center
- ConnDOT Infrastructure Monitoring Equipment
- ConnDOT Maintenance District 1

CRCOG
- CRCOG Website
- Archived Data Users
- CRCOG Regional Traffic Count Database

CT Department of Environmental Protection
- CT Department of Environmental Protection

CT DPS
- CSP Office of Administrative Services
- CSP Message Center
- CSP Emergency Vehicles
- CSP Troop H Dispatch

CT Transit
- CTRIDES.COM
- CT Transit Operations Center
- CT Transit Stations
- CT Transit Website
- Regional Transit Card
- CT Transit Kiosks
- CT Transit Ridership Database
- City of Hartford Regional Smart Card
- CT Transit Vehicles
- Transit Database Users

DATTCO
- DATTCO Transit Ridership Database
- DATTCO Website
- DATTCO Transit Dispatch
- DATTCO Transit Vehicles

DTN
- DTN Weather Service

Financial Institution
- Financial Institution

Greater Hartford Transit District
- GHTD Transit Dispatch
- GHTD Ridership Database
- GHTD Paratransit Vehicles
- GHTD Transit Website

Hartford Office of Emergency Management
- Hartford EOC

Exhibit 4-2: ITS Inventory by Stakeholder (cont'd.)

Independent School Districts
- Independent School District Buses
- Independent School District Dispatch

Local Media
- Local Print and Broadcast Media

Metropolitan District Commission
- MDC Dispatch

Middletown Transit District
- MTD Ridership Database
- MTD Transit Vehicles
- MTD Transit Dispatch
- MTD Website

Midstate Regional Planning Agency
- MRPA Traffic Count Database

Municipal or Regional Government
- Municipal and Regional Parking Facilities
- Municipal Traveler Information Websites
- Municipal or Regional Permitting System

Municipal or Regional Public Safety
- CAPTAIN System
- Municipal Fire Vehicles
- Municipal Fire Dispatch
- Municipal or Regional Public Safety Dispatch
- Municipal EOC
- Municipal Police Vehicles

Municipal Public Works Department
- Municipal Garages
- Municipal DMS
- Municipal Traffic Signals
- Municipal Vehicle Detectors
- Municipal CCTV Cameras
- Municipal Traffic Operations Center
- Municipal PWD Vehicles
- Municipal PWD

New Britain Transportation Company
- New Britain Transportation Company Ridership Database
- New Britain Transportation Company Website
- New Britain Transportation Company Transit Vehicles
- New Britain Transportation Company Transit Dispatch

NOAA
- Weather Services

Other States
- Other States TMCs
- Other States Maintenance Sections

Private Ambulance
- Private Ambulance Vehicle
- Private Ambulance Dispatch

Private Information Service Providers
- Private Sector Traveler Information Services

Private Maintenance Contractor
- Private Maintenance Contractor

Private Taxi Providers
- Private Taxi Provider Dispatch

Private Tow/Wrecker Providers
- Private Tow/Wrecker Vehicles
- Private Tow/Wrecker Dispatch

Private Transit Providers
- Private Transit Vehicles
- Other Transit Systems
- Private Transit Systems

Private Travelers
- Private Vehicles
- Private Travelers Personal Computing Devices

Rail Operators
- Rail Operators Wayside Equipment
- Rail Operations Centers

Regional Emergency and Public Safety Agencies
- North Central CMED Dispatch
- Greater Hartford Region Incident and Mutual Aid Network

Regional Medical Center
- Regional Medical EMS Vehicles
- Regional Medical Center

State of Connecticut
- CT Division of Homeland Security
- Service Agencies
- State Traffic Commission
- State Office of Emergency Management

The Rideshare Company
- Rideshare Website
- Rideshare Vans
- Rideshare Call Center

Tolland County Public Safety Dispatch
- Tolland County Public Safety Dispatch

TRANSCOM
- TRANSCOM TRIPS123
- TRANSCOM Servers

4.2 Inventory by Service

The inventory can also be considered according to the ITS service that each element provides. Exhibit 4-3 and Exhibit 4-4 present the inventory grouped by subsystem from the National ITS Architecture. Subsystems are the general component systems of the overall ITS architecture, representing the general functional areas that are addressed by ITS. This table ties each element to a specific subsystem, indicating the functional area that the element addresses.

Exhibit 4-3: ITS Inventory by National ITS Architecture Subsystem

Archived Data Management Subsystem
- CCRPA Traffic Count Database
- ConnDOT CT Statewide Crash Records Database
- ConnDOT Public Transportation Management System
- CRCOG Regional Traffic Count Database
- CT Transit Ridership Database
- DATTCO Transit Ridership Database
- GHTD Ridership Database
- MRPA Traffic Count Database
- MTD Ridership Database
- New Britain Transportation Company Ridership Database

Commercial Vehicle Administration
- Municipal or Regional Permitting System

Commercial Vehicle Subsystem
- Commercial Vehicles

Emergency Management
- CAPTAIN System
- City of Hartford Fire Alarms and Signals Division
- City of Hartford Public Safety Dispatch
- CSP Office of Administrative Services
- CSP Troop H Dispatch
- CT Department of Environmental Protection
- CT Transit Operations Center
- Hartford EOC
- Municipal EOC
- Municipal Fire Dispatch
- Municipal or Regional Public Safety Dispatch
- North Central CMED Dispatch
- Private Ambulance Dispatch
- Private Tow/Wrecker Dispatch
- State Office of Emergency Management
- Tolland County Public Safety Dispatch

Emergency Vehicle Subsystem
- City of Hartford Fire Vehicles
- City of Hartford Police Vehicles
- CSP Emergency Vehicles
- Municipal Fire Vehicles
- Municipal Police Vehicles
- Private Ambulance Vehicle
- Private Tow/Wrecker Vehicles
- Regional Medical EMS Vehicles

Fleet and Freight Management
- Private Fleet Management Systems
- Rail Operations Centers

Information Service Provider
- City of Hartford Website
- ConnDOT 511 System
- ConnDOT Office of Communications
- ConnDOT Web Page
- CRCOG Website
- CT Transit Website
- CTRIDES.COM
- DATTCO Website
- GHTD Transit Website
- MTD Website
- Municipal Traveler Information Websites
- New Britain Transportation Company Website
- Private Sector Traveler Information Services
- Rideshare Website
- Service Agencies
- TRANSCOM TRIPS123

Exhibit 4-4: ITS Inventory by National ITS Architecture Subsystem (cont'd.)

Maintenance and Construction Management
- City of Hartford Fire Alarms and Signals Division
- City of Hartford Public Works
- ConnDOT Maintenance District 1
- ConnDOT Storm Center
- MDC Dispatch
- Municipal Fire Dispatch
- Municipal PWD
- Other States Maintenance Sections
- Private Maintenance Contractor

Maintenance and Construction Vehicle
- City of Hartford Fire Alarms and Signals Division Maintenance Vehicles
- City of Hartford Public Works Vehicles
- ConnDOT Maintenance Vehicles
- Municipal PWD Vehicles

Parking Management
- ConnDOT Park-And-Ride Lots
- Municipal and Regional Parking Facilities

Personal Information Access
- Private Travelers Personal Computing Devices

Remote Traveler Support
- CT Transit Kiosks
- CT Transit Stations

Roadway Subsystem
- City of Hartford CCTV
- City of Hartford DMS
- City of Hartford Environmental Sensors
- City of Hartford Lane Control Signals
- City of Hartford RWIS
- City of Hartford Traffic Signals
- City of Hartford Vehicle Detectors
- City of Hartford Work Zone Equipment
- ConnDOT Anti-Icing Equipment
- ConnDOT CCTV
- ConnDOT DMS / HAR
- ConnDOT HOV Control System
- ConnDOT Ramp Meters
- ConnDOT RWIS Sensors
- ConnDOT Traffic Signals
- ConnDOT TRANSMIT Field Sensors
- ConnDOT Vehicle Detectors
- ConnDOT Work Zone Equipment
- Municipal CCTV Cameras
- Municipal DMS
- Municipal Traffic Signals
- Municipal Vehicle Detectors

Security Monitoring Subsystem
- ConnDOT Infrastructure Monitoring Equipment

Traffic Management
- City of Hartford Traffic Operations Center
- ConnDOT TMC Bridgeport
- ConnDOT TMC Newington
- CSP Message Center
- Municipal Traffic Operations Center
- Other States TMCs
- TRANSCOM Servers

Transit Management
- Amtrak Operations Center
- CT Transit Operations Center
- DATTCO Transit Dispatch
- GHTD Transit Dispatch
- Independent School District Dispatch
- MTD Transit Dispatch
- New Britain Transportation Company Transit Dispatch
- Other Transit Systems
- Private Taxi Provider Dispatch
- Private Transit Systems
- Rideshare Call Center

Transit Vehicle Subsystem
- CT Transit Vehicles
- DATTCO Transit Vehicles
- GHTD Paratransit Vehicles
- Independent School District Buses
- MTD Transit Vehicles
- New Britain Transportation Company Transit Vehicles
- Private Transit Vehicles
- Rideshare Vans

Vehicle
- Commercial Vehicles
- Private Vehicles

5. ITS ARCHITECTURE

At the core of the architecture development process is the definition of existing and planned interfaces between the component ITS elements in the architecture. Building on the work of the needs analysis, which resulted in an ITS inventory and an assessment of regional transportation needs, a full-day architecture development workshop was held with the Guidance Committee. In this workshop, the participants worked together to identify the components and interfaces that make up the draft architecture.

Turbo Architecture was used to develop the architecture, providing consistency with Version 5.0 of the National ITS Architecture. As part of this project, an interactive website was developed in order to provide users with an accessible way to review the architecture. This website allows a user to view the architecture in multiple ways and in varying levels of detail. The website can be found at the following location:

http://consystec.com/hartford/web/_regionhome.htm

This chapter provides a summary of various elements of the Regional ITS Architecture. Following this summary is a guide to the architecture website that will allow the reader to obtain further details from the architecture.

5.1 Summary of the Regional Architecture

In its most basic form, the architecture is a collection of ITS elements and the interfaces between them. However, due to their sheer number, it is impossible to display all these elements and interfaces in an understandable way. The architecture therefore provides a number of ways of approaching this information in a more useful manner.

One way is by the ITS inventory, presented in the previous chapter. The inventory, which is a listing of the component elements, can be considered both by stakeholder (e.g. all elements held by the CT Transit) or function (e.g. all elements relating to Emergency Management). Each element in the inventory has a number of interfaces with other elements (both of the same stakeholder as well as of others), and these interfaces can thus be considered for each element.

Another way of approaching the architecture is by considering Market Packages. These are groupings of elements and interfaces that address a specific functional area (e.g. maintenance vehicle tracking). Market Packages represent collections of subsystems and terminators that exchange information to provide a specific service. A market package can cut across stakeholders, including all elements and interfaces required to support a function.

Exhibit 5-1 presents the market packages identified for the Hartford area, grouped by service area. Note that not all of the market packages in the National ITS Architecture are included here. Instead, only the market packages that were determined by the stakeholders to be relevant to the region are included.

Exhibit 5-1: Hartford Area Market Packages

Traffic Management
- Network Surveillance
- Probe Surveillance
- Surface Street Control
- Freeway Control
- HOV Lane Management
- Traffic Information Dissemination
- Regional Traffic Control
- Traffic Incident Management System
- Standard Railroad Grade Crossing
- Railroad Operations Coordination
- Parking Facility Management
- Roadway Closure Management

Maintenance & Construction Management
- Maintenance and Construction Vehicle and Equipment Tracking
- Maintenance and Construction Vehicle Maintenance
- Road Weather Data Collection
- Weather Information Processing and Distribution
- Roadway Automated Treatment
- Winter Maintenance
- Roadway Maintenance and Construction
- Work Zone Management
- Work Zone Safety Monitoring
- Maintenance and Construction Activity Coordination

Public Transportation
- Transit Vehicle Tracking
- Transit Fixed-Route Operations
- Demand Response Transit Operations
- Transit Passenger and Fare Management
- Transit Security
- Transit Maintenance
- Multimodal Coordination
- Transit Traveler Information

Traveler Information
- Broadcast Traveler Information

Commercial Vehicle Operations
- CV Administrative Processes
- HAZMAT Management

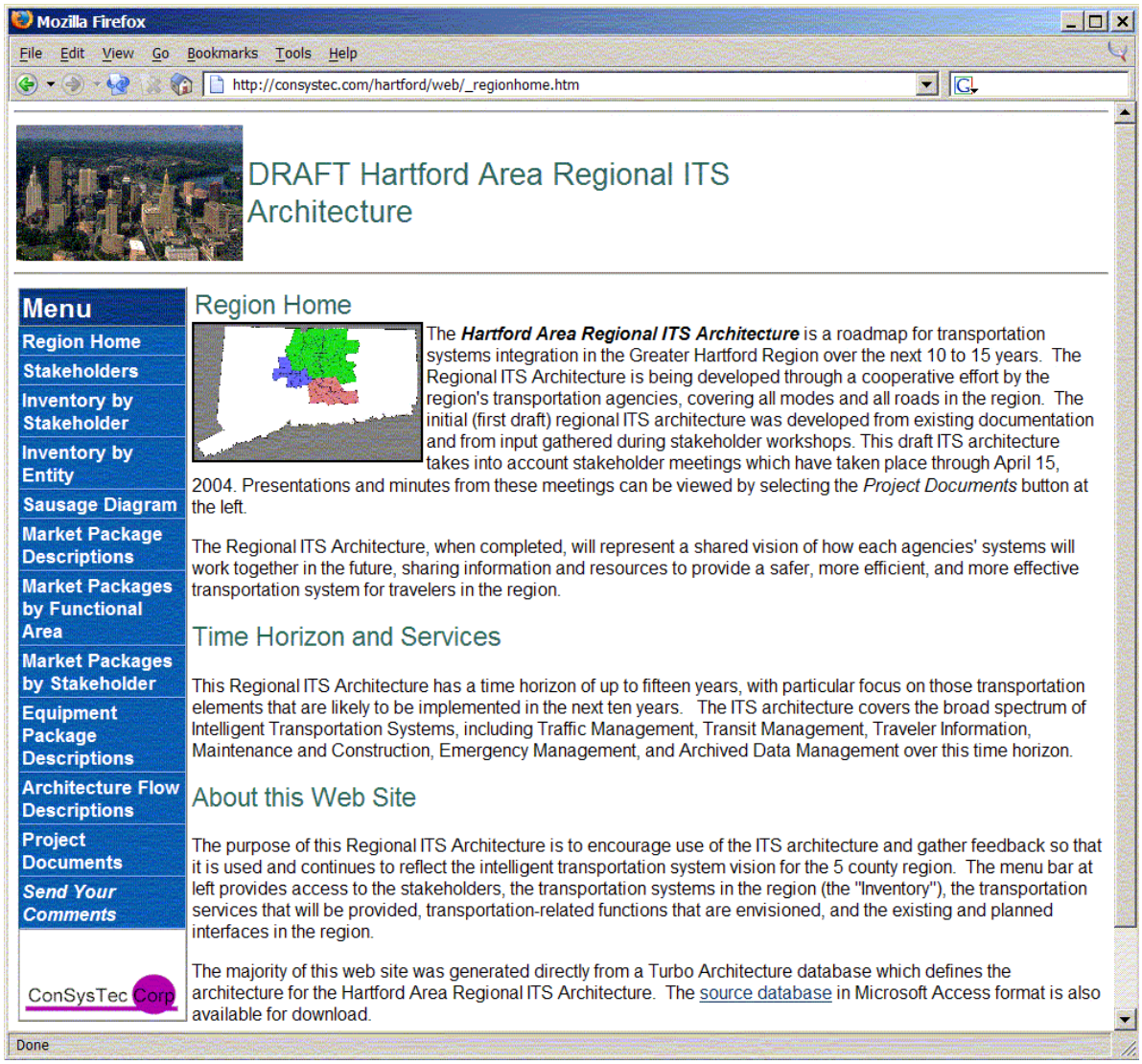
Emergency Management
- Emergency Call-Taking and Dispatch
- Emergency Routing
- Roadway Service Patrols
- Transportation Infrastructure Protection
- Wide-Area Alert
- Evacuation and Reentry Management

Archived Data Management
- ITS Data Mart

5.2 Navigating the Regional ITS Architecture

This section provides an overview of the Regional ITS Architecture website. Exhibit 5-2 depicts the homepage of the website. Along the left side of the page are a series of buttons that link to different pages of the website. The pages to which each of these buttons leads are described below.

Exhibit 5-2: Regional ITS Architecture Website Homepage



- **Region Home:** This button returns the user to the Hartford Area architecture homepage.

- **Stakeholders:** This page presents the full list of regional stakeholders, along with descriptions for each.

- **Inventory by Stakeholder:** This page presents the inventory of ITS elements, arranged by stakeholder. This allows all the elements held by a single stakeholder to be viewed simultaneously. Clicking on an element name links to a detail page for that element that provides more information, including a listing of all interfacing elements.

- **Inventory by Entity:** This page presents the inventory of ITS elements, arranged by entity (subsystems and terminators). This allows all elements with related functions to be viewed simultaneously. Clicking on an element name links to a detail page for that element.

- **Sausage Diagram:** The Architecture Interconnect Diagram (a.k.a. the "Sausage Diagram") illustrates the ITS subsystems and terminators present in the Regional ITS Architecture. Along the perimeter of the diagram are tables for each subsystem and terminator, identifying the specific regional instances of each subsystem or terminator.

- **Market Package Descriptions:** This page presents descriptions for each of the market packages that are included in the architecture.

- **Market Packages by Functional Area:** This page presents a table of the relevant market packages for the region, grouped by service area. Clicking on the market package number links to a series of customized diagrams for each package. These market package diagrams illustrate the elements and interfaces that are contained in that market package. Each subsystem or terminator in a market package diagram is labeled with both its generic National ITS Architecture name and the name of the local stakeholder instance that participates in the customized market package. In this way the market package identifies the information exchange (using architecture flows) between specific stakeholders elements in the region to affect a particular service or set of services.

- **Market Packages by Stakeholder:** This page presents a list of the relevant market packages for each stakeholder. Clicking on a market package links to the customized diagram in which that stakeholder's element appears.

- **Equipment Package Descriptions:** This page presents descriptions of the relevant equipment packages from the architecture. Equipment packages represent specific functions carried out by the subsystems.

- **Architecture Flow Descriptions:** This page presents descriptions of the relevant architecture flows from the architecture. Architecture flows appear in the interface diagrams, indicating what information is exchanged between two different components.

- **Project Documents:** This page contains documents generated through the architecture development project, including presentations that were given at stakeholder meetings and the input workshop.

- **Send Your Comments:** This button launches the user's email application, allowing him or her to send comments on the website to the project team. This was one of the recommended means of providing feedback on the draft website.

6. OPERATIONAL CONCEPT

The purpose of an operational concept is to define the roles and responsibilities of the participating agencies in the implementation of the elements of an ITS strategy. The overall operational concept that has evolved for the region through this study has generally followed and expanded upon the recommendations of the 1997 Strategic Plan for the Capitol Region. The overall architecture recommended (see Exhibit 3-1) remains valid and has been adapted to include agencies within the areas covered by the Central Connecticut Regional Planning Agency and the Midstate Regional Planning Agency. In this framework, with minor exceptions, operation of field equipment and other ITS elements remains under the control of the agency that owns the element. Interfaces between agencies are therefore center-to-center, focusing on coordination of operations.

As part of the operational concept, the study has identified a number of "market packages," which are groupings of elements and interfaces that address a specific functional area. These market packages are derived from recommendations contained in the National ITS Architecture. In the regional ITS architecture, the market packages are customized to the region, with the specific agencies and interfaces noted. A market package can fall under the jurisdiction of a single agency (e.g., HOV lane management is solely the responsibility of ConnDOT), or it can cut across stakeholders in cases where coordination is required.

For example, Exhibit 6-1 illustrates the Winter Maintenance market package, customized for the Hartford area and specifically considering operations for the City of Hartford. As the figure illustrates, information is exchanged among various systems under the jurisdiction of the City of Hartford, with external information provided by a weather service provider. This market package diagram thus constitutes the operational concept for winter maintenance for the City of Hartford.

In other cases, a market package includes multiple stakeholders. For example, Exhibit 6-2 illustrates the Regional Traffic Control market packages, as customized for the region. In this case, as the figure illustrates, information is exchanged among systems at numerous agencies. Again, however, this market package diagram represents the operational concept for this service, namely regional traffic control, illustrating the information that each agency is responsible for providing.

The completed Regional ITS Architecture provides diagrams that cover all of the market packages that the stakeholders determined were relevant to the Hartford Area, shown in Exhibit 5-1. The full set of market package diagrams is available on the Regional ITS Architecture website.

Exhibit 6-1: Winter Maintenance Market Package Diagram

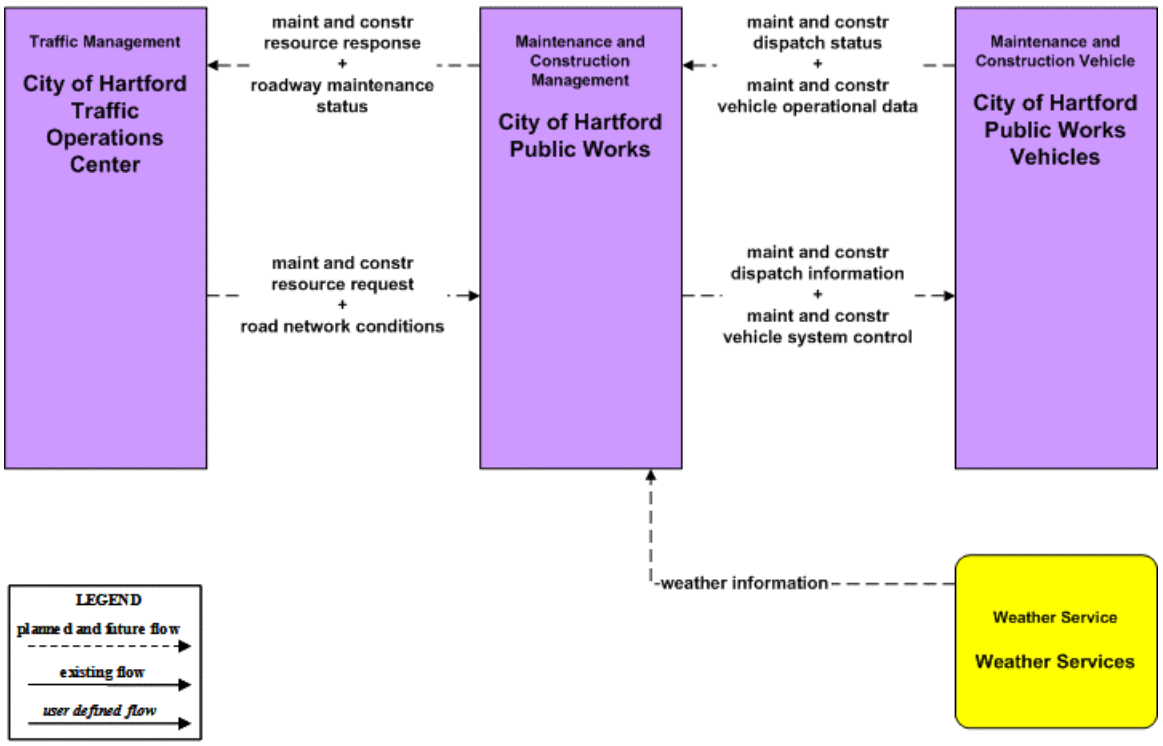
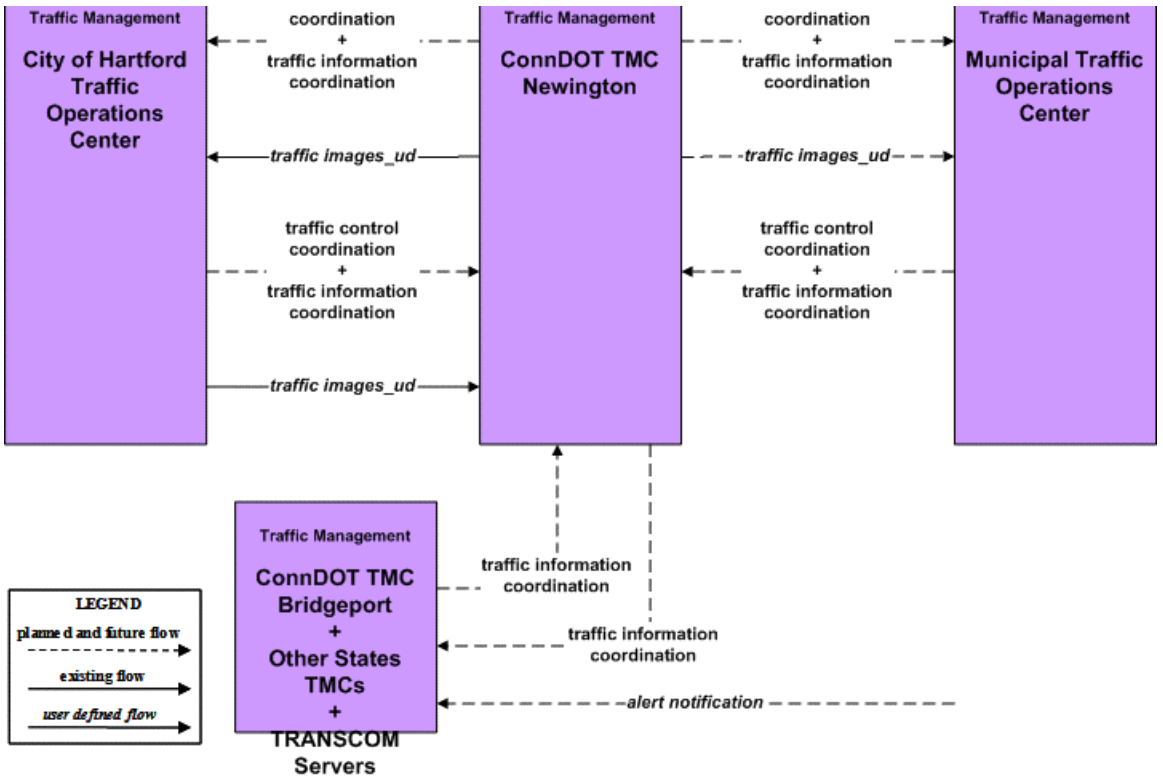


Exhibit 6-2: Regional Traffic Control Market Package Diagram



7. FUNCTIONAL REQUIREMENTS

The market packages discussed in the previous section identify the services that the inventory elements provide. Each element, however, performs a particular function as part of that larger market package. The National ITS Architecture defines a set of "equipment packages" that describe the functions that must be performed by each subsystem. These equipment packages, therefore, describe the functional requirements for each inventory element that maps to a subsystem.

Appendix D lists the equipment packages that are relevant to the Hartford Area, along with descriptions of each that outline the functional requirements. In the architecture, each inventory element is associated with one or more equipment packages, which thus define the functional requirements for each element. For example, Exhibit 7-1 shows the detail page from the architecture website for the Municipal Traffic Signals element. This element is shown to fall under four equipment packages. Therefore, the functional requirements for this element consist of the requirements for those four equipment packages. The equipment packages associated with each inventory element can be found in the Regional ITS Architecture website.

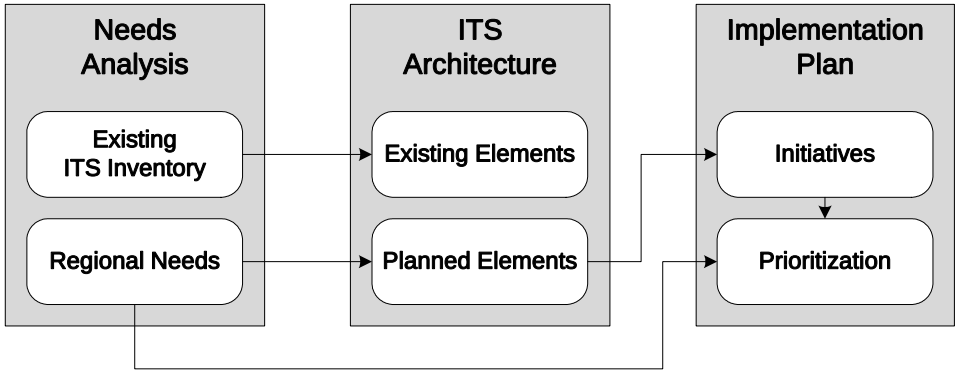
Exhibit 7-1: Sample Element Detail Page: Municipal Traffic Signals

ITS Element: Municipal Traffic Signals	
Description:	Municipal owned and/or operated traffic signal control field equipment.
Status:	Existing
Stakeholder:	Municipal Public Works Department
Mapping:	Roadway Subsystem Other Roadway
Interfaces: 	DATTCO Transit Vehicles MTD Transit Vehicles Municipal Fire Vehicles Municipal PWD Municipal Traffic Operations Center New Britain Transportation Company Transit Vehicles Rail Operators Wayside Equipment
Market Packages:	APTS7 - Multi-modal Coordination ATMS03 - Surface Street Control ATMS13 - Standard Railroad Grade Crossing EM02 - Emergency Routing MC07 - Roadway Maintenance and Construction
Equipment Packages:	Roadway Infrastructure Monitoring Roadway Signal Controls Roadway Signal Priority Standard Rail Crossing

8. IMPLEMENTATION PLAN

The Implementation Plan is a strategy for implementing the systems defined in the Regional ITS Architecture. This strategy is developed directly from preceding steps in the architecture development process, as illustrated in Exhibit 8-1.

Exhibit 8-1: Implementation Plan Development Process



The architecture identifies a large number of ITS elements for the region, classified as either "existing" or "planned". Elements classified as "existing" are those that are already implemented or those that are far enough along in the design stage that the interfaces are already determined. These elements, identified in the ITS inventory from the needs analysis, therefore do not need to be addressed in the Implementation Plan.

The elements that must be considered in the Implementation Plan are those classified as "planned", i.e. those that have not yet been designed or implemented. These elements were identified based on the regional needs from the needs analysis and the input from stakeholders during the architecture workshop. In addition to the planned ITS elements, there are also planned interfaces that must be considered. For example, a planned interface between two existing control centers must be included in the Implementation Plan, even though it is not associated with a planned element in the inventory.

The planned elements and interfaces are then grouped into a series of initiatives that represent a means of implementing these components. In some cases, an initiative may correspond to a single project that an agency can implement. In other cases, however, an initiative can be implemented through a series of projects at one agency or even across multiple agencies. For example, implementation of transit vehicle tracking is an initiative that is likely to be deployed in stages, with different agencies implementing systems at different times, according to their internal capital and strategic planning strategies.

It is important to note that the Implementation Plan differs from a "strategic plan" in that it does not seek to prioritize the initiatives recommended for implementation. Instead, the established transportation planning process for the areas in the study region remains the method by which priorities are addressed. The plan also does not attempt to set priorities for agencies in the region, as internal assignment of resources is the responsibility of each individual agency. Instead, the plan offers recommendations for how ITS should be implemented on a regional level.

The sections below present the initiatives that are recommended to implement the planned systems shown in the architecture, grouped by functional area.

8.1 Traffic Management

Probe Surveillance

This initiative provides an interface between Transit and Traffic management centers to support reporting of transit vehicle travel times for surveillance purposes.

Field Equipment Deployment

This initiative consists of further deployment of field equipment for monitoring traffic conditions and for dissemination of information to drivers on the region's roadways. It includes installation of new systems (e.g. for municipalities) as well as expansion of existing systems.

Traffic Information Dissemination

This initiative provides interfaces between traffic management centers and other agencies and organizations to support dissemination of information on traffic conditions. Interfacing agencies include transit management centers, emergency management centers, information service providers, and maintenance/construction management centers.

Traffic Management Coordination

This initiative provides interfaces between traffic management centers to support coordination of traffic control and incident response. It includes sharing of incident information, video images, and response measures. It also includes coordination with maintenance and emergency management centers for coordination of incident response.

Rail Crossing Management

This initiative provides interfaces to support operation of rail crossings, including status of field equipment and coordination between traffic operations centers and rail operations centers.

8.2 Parking Management

Parking Information Dissemination

This initiative supports provision of parking lot status (e.g. number of spaces available) to travelers through existing information dissemination channels, including web pages, highway advisory radio, and variable message signs.

Electronic Payment for Parking Facilities

This initiative implements a system to support electronic payment at parking facilities throughout the region. This system is envisioned to be interoperable with a regional smart card for transit.

8.3 Maintenance and Construction Management

CAD/AVL for Maintenance Vehicles

This initiative supports provision of CAD/AVL systems for maintenance and construction vehicles, allowing tracking and efficient dispatching of those vehicles. It also includes reporting of vehicle conditions to the dispatch center to support vehicle maintenance management.

Weather Information Dissemination

This initiative provides interfaces to support provision of roadway conditions and weather information by traffic management centers (e.g. ConnDOT and municipalities) to other centers,

including transit management, emergency management, and other traffic management centers. It also includes provision of information to the public through other distribution channels (e.g. the media).

Maintenance and Construction Activity Coordination

This initiative provides interfaces among management centers for coordination of maintenance and construction activity, including planned work zone locations and activities. Dissemination of information to other operations centers (e.g. roadway, transit, emergency management) to be provided through interfaces developed under the Traffic Information Dissemination initiative.

8.4 Public Transportation

CAD/AVL for Transit and Paratransit Vehicles

This initiative supports provision of CAD/AVL systems for transit vehicles, allowing tracking and efficient dispatching of those vehicles. Also includes reporting of vehicle conditions to the dispatch center to support vehicle maintenance management.

Electronic Fare Payment for Transit and Paratransit

This initiative introduces acceptance of a regional fare card across transit agencies in the region. This is envisioned to be an extension of the existing CT Transit fare card, with potential for upgrading the system to smart-card technology. This initiative also includes automated kiosks for fare card vending.

Transit Security (On-Board)

This initiative provides for on-board surveillance capabilities for transit vehicles, including real-time transmission of video images back to the dispatch center for monitoring purposes. This also includes emergency notification via silent alarm between dispatch and vehicles.

Transit Security (Facilities)

This initiative provides for surveillance capabilities for transit facilities, including stations and bus shelters. This also includes real-time transmission of video images back to the dispatch center for monitoring purposes.

Transit Management Coordination

This initiative provides interfaces among the transit management centers in the region to support coordination of transit operations. Information to be exchanged includes updates on connecting services.

Traffic Signal Priority

This initiative provides for traffic signal priority for transit vehicles in the region. The systems to be implemented under this initiative will support requests for priority from the transit vehicle to the local signal controller or requests from the transit dispatch center to the central signal system if such systems are present.

8.5 Traveler Information

Integrated Transit Information

This initiative provides for a centralized transit information system that integrates traveler information from the various transit providers in the region. This is envisioned to be an extension of

the existing CT Transit website, along with additional dissemination methods, including electronic information kiosks and personal communication devices (e.g. phones and PDAs).

Roadway Information

This initiative provides for travel information systems for roadways in the region. This is envisioned to be extensions of existing webpages maintained by ConnDOT and by municipalities. Information to be provided includes traffic and construction information. The initiative will also support dissemination of information to the media, to personal communication devices, and to information service providers.

511 Travel Information System

This initiative establishes a centralized travel information system that integrates roadway and transit information, for dissemination via an interactive telephone system. This system will interface with the individual travel information systems operated across the region to provide information to travelers through a single consolidated source.

8.6 Commercial Vehicle Operations

Commercial Vehicle Coordination

This initiative provides for interfaces between existing municipal and regional CVO permitting systems and traffic and emergency management centers. This supports automated notification to these centers of information that will affect operations, such as oversize/overweight vehicles and Hazmat vehicles.

8.7 Emergency Management

Emergency Management Coordination

This initiative creates a formalized Mutual Aid Network for the Greater Hartford Region, covering emergency information and incident response coordination. Participants include the State Police, Municipal and regional emergency operations and dispatch centers, and the State Office of Emergency Management. It also includes interfaces with roadway, transit, and maintenance operations centers for coordination of emergency response.

CAD/AVL for Emergency Vehicles

This initiative supports provision of CAD/AVL systems for emergency vehicles, allowing tracking and efficient dispatching of those vehicles. It also includes automated provision of incident status and response requests to emergency vehicles.

Emergency Vehicle Routing and Signal Preemption

This initiative provides interfaces to support coordination between emergency and traffic operations centers to allow efficient routing of emergency vehicles. Real-time traffic conditions from traffic control centers allow emergency dispatch centers to provide recommended routes to its vehicles. Vehicles can also request priority at traffic signals along their routes, with priority being granted by the appropriate traffic control center.

8.8 Archived Data Management

Regional Traffic Count Database

This initiative provides centralized databases at each Regional Planning Agency for traffic data in that region. Sources of real-time data include the ConnDOT Traffic Operations Center in Newington and municipal traffic operations centers.

Regional Transit Planning Database

This initiative provides a centralized database for transit planning data. Information is consolidated from transit providers in the region, including CT Transit, DATTCO, New Britain Transportation, Middletown Transit, and Greater Hartford Transit District.

Statewide Crash Records System

This initiative provides automated interfaces between ConnDOT Statewide Crash Records Database and the State Police, as well as an automated interface for municipal police to report accidents to State Police.

9. OPERATIONAL AGREEMENTS

The Regional ITS Architecture provides both a technical and institutional framework for the deployment of ITS in the Hartford area. This involves coordination between various agencies and jurisdictions to achieve seamless operations and/or interoperability. This section discusses considerations for developing interagency agreements for operating the systems defined in the regional architecture.

9.1 Elements of an Agreement

Agreements are established to clearly define responsibilities among the involved parties. The level of formality generally increases as risks escalate and when financial transactions take place. Formality will also increase when the performance or lack of performance on the part of one organization impacts the operations of another. For example, if an agency maintains and operates the traffic signals of another agency, failure to restore a malfunctioning traffic signal in a timely fashion could have a significant impact. As different systems are linked together, they will depend upon each other. The clear definition of responsibilities for all parties will help ensure smooth operations.

The following is a list of elements to consider in the development of an agreement for ITS operations and maintenance. It should be noted that not all elements are relevant to each exchange of information; instead, the level of specificity will depend on the nature of the information link.

- Operational Concept (an introduction to the nature and purpose of the agreement)
- Benefits of the agreement (e.g. operational, economic)
- Duties of Responsible Organizations (a summary of duties and responsibilities)
- Data Sharing (aspects of sharing data to be considered)
  - Provision of Data
  - Data Rights
  - Data Reuse
  - Data Identification
  - Data Availability
  - Data Accuracy
- Control Sharing (aspects of sharing control to be considered with rights and priorities being clearly understood)
  - Provision of Control
  - Control Rights
  - Control Restrictions
  - Control Priority
  - Control Availability
- Connections (defines how the connection is made)
  - Provision of Equipment
  - Physical Access Point
  - Demarcation Point
  - Security
  - Configuration Management
  - Standards and Protocols
- System Documentation

- Operations
  - Contacts
  - Hours of Operations
  - Responsibilities
- Maintenance
  - Contacts
  - Hours of Operations
  - Responsibilities
  - Response Time
- Liability
  - Indemnity
  - Damage to Equipment
  - Liability
- Ownership
  - Equipment
  - Software
  - Intellectual Property
- Coordination
  - Notification
  - Periodic Reporting
  - Pre-Change Coordination Meeting
- Dispute Resolution
- Termination of Agreement
- Compensation

9.2 Recommended Agreements

In general, all interagency interfaces without existing formal agreements are candidates for operational agreements. This includes interfaces under development or proposed in the architecture that have not yet been implemented, as well as interfaces that are currently operational but without a formal agreement.

9.2.1 FORMALIZATION OF EXISTING WORKING ARRANGEMENTS

Although some agencies may be reluctant to formalize an existing informal agreement that is operating without problems, there are a number of considerations that point to the need for adoption of a formal agreement:

- ***Rationale for agreement:*** A formal agreement that explains the reasoning behind the agreement and that lays out the benefits of the cooperation will help justify the arrangement to the participating parties, other agencies that would benefit from coordination, and to the public. This will help build and maintain support for continuing a beneficial relationship, especially when the agreement may be reconsidered in the future.

- ***Documentation of procedures:*** By documenting existing procedures that are operating successfully, a formal agreement can help maintain an interface in the face of personnel or administrative change. An informal agreement that relies solely on interpersonal relationships at the operating level may quickly dissolve if operating staff changes occur.

- ***Institutional commitment:*** Adopting a formal agreement shows commitment by the participating agencies to continue the relationship. While an informal agreement shows commitment at the operating level, a formal agreement shows commitment at the institutional level. Support for a relationship at the administrative levels of the participating agencies will be essential for continued or expanded funding for the interface.

- ***Liability issues:*** In a cooperative arrangement, situations may arise where one or both parties may be held liable for damage or injuries sustained as a result of human or technical error. A formal agreement that documents agency roles and responsibilities with consideration for liability concerns will speed the process of conflict resolution and reduce resulting legal costs.

For the reasons outlined above, it is highly recommended that existing working arrangements be considered for formalization.

9.2.2 AGREEMENTS FOR NEW INTERFACES

The other source for new agreements will be the new interfaces proposed in the regional architecture. As with the existing informal agreements, all interagency interfaces will benefit from formal agreements. Exhibit 9-1 and Exhibit 9-2 list the agreements that are required to support the implementation and operation of the initiatives identified in the Implementation Plan.

Exhibit 9-1: Agreements Required to Support Initiatives

	Initiative	Required Agreements
Traffic Management	Probe Surveillance	• Roadway Management (ConnDOT, municipalities) and Transit Management (RTAs)
	Field Equipment Deployment	• None (single agency implementations)
	Traffic Information Dissemination	• Roadway Management and other Roadway Management • Roadway Management and Transit Management • Roadway Management and Emergency Management • Roadway Management and Private Service Providers
	Traffic Management Coordination	• Roadway Management and other Roadway Management • Roadway Management and Emergency Management
	Rail Crossing Management	• Roadway Management and Rail Operators
Parking Management	Parking Information Dissemination	• Parking Operators and Roadway Management
	Electronic Payment for Parking Facilities	• Parking Operators and Financial Institutions • Parking Operators and Transit Operators (if based on transit fare card)

Exhibit 9-2: Agreements Required to Support Initiatives (cont'd.)

	Initiative	Required Agreements
Maintenance and Construction Management	CAD/AVL for Maintenance Vehicles	• None (single agency implementations)
	Weather Information Dissemination	• Roadway Management and other Roadway Management • Roadway Management and Transit Management • Roadway Management and Emergency Management
	Maintenance and Construction Activity Coordination	• Maintenance Management and other Maintenance Management
Public Transportation	CAD/AVL for Transit and Paratransit Vehicles	• None (single agency implementations)
	Electronic Fare Payment for Transit and Paratransit	• Transit Management and Financial Institution • Transit Management and other Transit Management
	Transit Security (On-Board)	• None (single agency implementations)
	Transit Security (Facilities)	• None (single agency implementations)
	Transit Management Coordination	• Transit Management and other Transit Management
	Traffic Signal Priority	• Transit Management and Roadway Management
Traveler Information	Integrated Transit Information	• Transit Management and other Transit Management
	Roadway Information	• Roadway Management and other Roadway Management
	511 Travel Information System	• ConnDOT (lead agency) and other Roadway Management • ConnDOT and Transit Management
Commercial Vehicle Operations	Commercial Vehicle Coordination	• CVO Management (state, municipalities) and Roadway Management • CVO Management and Transit Management
Emergency Management	Emergency Management Coordination	• Emergency Management and other Emergency Management • Emergency Management and Roadway Management • Emergency Management and Transit Management
	CAD/AVL for Emergency Vehicles	• None (single agency implementations)
	Emergency Vehicle Routing and Signal Preemption	• Emergency Management and Roadway Management
Archived Data Management	Regional Traffic Count Database	• Regional Planning Agencies and Roadway Management
	Regional Transit Planning Database	• ConnDOT (lead agency) and Transit Management
	Statewide Crash Records System	• ConnDOT and State Police • Municipal Police and State Police

10. ITS STANDARDS

ITS standards are specifications that govern the interconnection of transportation system components. They contain and specify the technical details on how to build and integrate ITS systems and components in a way that facilitates interoperability. Standards provide the technical detail that enables the design and deployment of an integrated ITS system throughout the region. Standards allow different systems to speak to each other in a common language, using common data elements, well-defined data structures or ”messages”, and well-understood protocols or rules for data exchange and sharing. The use of common ITS standards completes the technical integration aspect of the regional architecture.

ITS standards are being developed by several working groups composed of public- and private-sector stakeholders within Standards Development Organizations (SDOs). The process is partially supported by the US Department of Transportation. There are seven SDOs actively participating in ITS standards development activities:

- AASHTO (American Association of State Highway and Transportation Officials)
- ANSI (American National Standards Institute)
- ASTM (American Society for Testing and Materials)
- IEEE (Institute of Electrical and Electronics Engineers)
- ITE (Institute of Transportation Engineers)
- NEMA (National Electrical Manufacturers Association)
- SAE (Society of Automotive Engineers)

There are approximately 80 standards that are unique to ITS applications. Many of these 80 standards have already passed through the development process, and have been approved and published by the applicable SDO(s). Others are progressing and will be approved soon.

From the perspective of USDOT and its agencies, the use of ITS standards is not currently mandatory. However in TEA-21, Congress required the USDOT to "ensure that ITS projects carried out using funds made available from the Highway Trust Fund…conform to the national architecture, applicable standards, or provisional standards and protocols." Thus it is anticipated that the use of ITS standards will be made mandatory by a rulemaking process that begins with the USDOT publishing a "Notice of Proposed Rulemaking (NPRM)" in The Federal Register and includes a public comment period. If the rule is made final, it will lead to USDOT “adopting” specific ITS standards. Once these particular published standards are adopted, their use will be mandatory in applicable ITS projects that receive federal funding. In the interim, it makes good sense to utilize approved ITS standards in system design and implementation regardless of their being mandatory. This approach has little risk and facilitates future integration opportunities for pre-adopted standards-based legacy ITS systems.

The Regional ITS Architecture, therefore, does not recommend a specific standard for each interface. Because standards continue to evolve, it would be premature for the architecture to dictate what standards to use when an initiative is only in the conceptual stage. Instead, the architecture presents the standards that are relevant, with the expectation that they will be considered in the project design. These standards are presented in Exhibit 10-1 and Exhibit 10-2.

Exhibit 10-1: Relevant ITS Standards

SDO	Document ID	Title	Type
AASHTO / ITE / NEMA	NTCIP 1201	Global Object Definitions	Message
	NTCIP 1202	Object Definitions for Actuated Traffic Signal Controller Units	Message
	NTCIP 1203	Object Definitions for Dynamic Message Signs	Message
	NTCIP 1204	Object Definitions for Environmental Sensor Stations & Roadside Weather Information System	Message
	NTCIP 1205	Data Dictionary for Closed Circuit Television (CCTV)	Message
	NTCIP 1206	Data Collection & Monitoring Devices	Message
	NTCIP 1207	Ramp Meter Controller Objects	Message
	NTCIP 1208	Object Definitions for Video Switches	Message
	NTCIP 1209	Transportation System Sensor Objects	Message
	NTCIP 1210	Objects for Signal Systems Master	Message
	NTCIP 1211	Objects for Signal Control Priority	Message
	NTCIP 1301	Message Set for Weather Reports	Message
	NTCIP 1401	TCIP – Common Public Transportation (CPT) Business Area Standard	Message
	NTCIP 1402	TCIP - Incident Management (IM) Business Area Standard	Message
	NTCIP 1403	TCIP - Passenger Information (PI) Business Area Standard	Message
	NTCIP 1404	TCIP - Scheduling/Runcutting (SCH) Business Area Standard	Message
	NTCIP 1405	TCIP - Spatial Representation (SP) Business Area Standard	Message
	NTCIP 1406	TCIP - Onboard (OB) Business Area Standard	Message
	NTCIP 1407	TCIP - Control Center (CC) Business Area Standard	Message
	NTCIP 1408	TCIP - Fare Collection (FC) Business Area Standard	Message
		NTCIP Center-to-Center Standards Group	Communication
		NTCIP Center-to-Field Standards Group	Communication
ANSI	ANSI TS285	Commercial Vehicle Safety and Credentials Information Exchange	Message
	ANSI TS286	Commercial Vehicle Credentials	Message
ASTM	ASTM 5 GHz Data Link	Standard Specification for 5.9 GHz Data Link Layer	Communication
	ASTM 5 GHz Phys	Standard Specification for 5.9 GHz Physical Layer	Communication
	ASTM DD 17.54.00.2	ADMS Data Dictionary Specifications	Data
	ASTM PS 105-99	Specification for Dedicated Short Range Communication (DSRC) Data Link Layer: Medium Access and Logical Link Control	Communication
	ASTM PS 111-98	Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz	Communication
EIA/CEA	CEA/EIA-794	Data Radio Channel (DARC) System	Communication
	CEA/EIA-795	Subcarrier Traffic Information Channel (STIC) System	Communication

Exhibit 10-2: Relevant ITS Standards (cont'd.)

SDO	Document ID	Title	Type
IEEE	IEEE P1512.1	Standard for Traffic Incident Management Message Sets for Use by EMCs	Message
	IEEE P1512.2	Standard for Public Safety IMMS for use by EMCs	Message
	IEEE P1512.3	Standard for Hazardous Material IMMS for use by EMCs	Message
	IEEE P1512.a	Standard for Emergency Management Data Dictionary	Data
	IEEE P1512-2000	Standard for Common Incident Management Message Sets (IMMS) for use by EMCs	Message
	IEEE P1556	Security/Privacy of Vehicle/RS Communications including Smart Card Communications	Communication
	IEEE P1570	Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection	Message
	IEEE Std 1455-1999	Standard for Message Sets for Vehicle/Roadside Communications	Message
ITE	ITE TM 1.03	Standard for Functional Level Traffic Management Data Dictionary (TMDD)	Data
	ITE TM 2.01	Message Sets for External TMC Communication (MS/ETMCC)	Message
	ITE TS 3.TM	TCIP - Traffic Management (TM) Business Area Standard	Message
SAE	SAE J1746	ISP-Vehicle Location Referencing Standard	Data
	SAE J2313	On-Board Land Vehicle Mayday Reporting Interface	Message
	SAE J2353	Data Dictionary for Advanced Traveler Information System (ATIS)	Data
	SAE J2354	Message Set for Advanced Traveler Information System (ATIS)	Message
	SAE J2369	Standard for ATIS Message Sets Delivered Over Bandwidth Restricted Media	Message
	SAE J2529	Rules for Standardizing Street Names and Route IDs	Message
	SAE J2540	Messages for Handling Strings and Look-Up Tables in ATIS Standards	Message

11. SUMMARY

A Regional ITS Architecture for the Hartford area has been undertaken for several reasons. The first and foremost is the opportunity it affords to allow the region's distinctive agencies to coordinate their efforts in planning and maintaining ITS for the area. The agencies have participated in the evolution of the ITS Architecture and have worked to reach agreement on the vision and elements of the plan. Maintenance of the Architecture will afford future and continuous opportunities for these agencies to coordinate their efforts.

A second reason for formulating a Regional ITS Architecture is to establish and agree upon standards for agencies to incorporate into their work. These standards are guided by federal regulations, and help agencies meet specific needs that are recognized by others who also operate ITS activities. In turn, these standards provide a basis for coordination of efforts among the agencies as they plan for improvements and analyze the needs of their constituents.

Finally, emerging and established federal requirements require that regional ITS components conform to federal ITS architecture and technical standards. This requirement has driven the development of a plan that is in conformity with federal requirements.

Architecture Development Approach

The Hartford Area Regional ITS Architecture was developed through the active participation of representatives of agencies most affected by its potential impacts. Comments and discussions of these representatives led to a framework for ITS that incorporates values and programs of each agency into the needs analysis, the regional architecture and recommendations.

Based on stakeholder participation, a needs analysis was undertaken, where existing plans, programs and expectations were listed and described. This analysis was supplemented by examination of prior plans for integration of transportation services to form a basis for the Regional ITS Architecture. Future needs were carefully examined and assembled in terms of services already in place or in planning.

Methods for agencies to share information and kinds of information to share were examined to provide a basis for an operational concept and an implementation plan. The operational concept examined information-sharing between agencies in detail, including the types of information to be exchanged and roles of the participants. The implementation plan outlines the steps that need to be taken to fulfill the vision of the architecture, in terms of investments that may be required and initiatives to be taken to put components into place.

Architecture Themes

During the assessment of needs and the conversations and discussions with representatives of the agencies, a number of themes emerged and helped to give direction to the development of the Regional ITS Architecture. These themes varied, to some extent depending on the focus of the agency involved.

A principal theme was coordination of responders to incidents, where there is a need for common definitions of incidents, identification of locations, and scenarios for responsibilities in handling the incidents. A related theme was that of information sharing to allow for coordination of services. All agencies agreed on the need for continuous data collection, asserting that data is essential to effective ITS. For example, transit agencies expressed a need for implementation of AVL, to provide

information to be used by the agency and shared with others. As a parallel need, certain highway agencies looked forward to GPS, for example, to locate tow trucks.

The theme of infrastructure needs was also expressed by agencies reflecting on methods and resources that are necessary to carry out their responsibilities and to share information with others. This theme was coupled with the need for consideration of the requirements for continuous operations and maintenance and consequent upgrading of facilities and equipment. The most prevalent example was traffic signals, where coordination between the state and the towns is essential. Another theme was the development of shared systems where possible. An example was cited of ConnDOT and the City of Hartford sharing in development and deployment of CCTV cameras.

Recommendations

Distinctive categories of initiatives are recommended to implement the planned components of the regional framework. They have been grouped by the following functional areas: traffic management, parking management, maintenance and construction management, public transportation, traveler information, commercial vehicle operations, emergency management and archived data management. These initiatives have not been assigned to particular agencies, but allow for evolution of leadership among the regional agencies participating in the ITS framework.

Recommendations on prioritization were based on input from stakeholders throughout the architecture development process. The ITS architecture development workshop served to further identify initiatives as high-priority and thus recommended for short-term implementation. Methods for implementing these priority items and for furthering working relationships among the agencies are included in the form of operational agreement elements and recommended working arrangements supported by these agreements.

Finally, the Regional ITS Architecture outlines the national ITS standards that are being developed by seven Standards Development Organizations, supported in part by USDOT. Although not yet mandatory, standards for ITS implementation are anticipated to be made mandatory by a future federal rulemaking process.

The Architecture as a Tool

The Hartford Area Regional ITS Architecture is essential for planning and implementing plans and services in the region. The ITS program is intended to be implemented through each Transportation Improvement Program (TIP) for the three Metropolitan Planning Organizations serving the region included in the study. Federal regulations require regional ITS elements with federally funded components to conform to a regional ITS framework based on the National ITS Architecture. Projects proposed for the TIP must be shown to conform with regional ITS requirements. If conformity is not shown, a project can be modified to conform with regional ITS programs or the project's proponent may request a modification of the architecture to accommodate a project. Modifications will trigger convening affected stakeholders to review the request. A regular update of the architecture should be undertaken to conform to regional transportation plans, currently updated on a three-year cycle. Updating should also reflect changing needs and priorities of the region. Because it will include review by stakeholders, each update may be an appropriate time to consider modifications to the architecture to accommodate any proposals that may not be included in the ITS architecture.

APPENDIX A

FHWA RULE ON ITS ARCHITECTURE AND STANDARDS

Federal Register

Monday,
January 8, 2001

Part IV

Department of Transportation

Federal Highway Administration

23 CFR Parts 655 and 940
Intelligent Transportation System Architecture and Standards; Final Rule

Federal Transit Administration

Federal Transit Administration National ITS Architecture Policy on Transit Projects; Notice

DEPARTMENT OF TRANSPORTATION

Federal Highway Administration

23 CFR Parts 655 and 940

[FHWA Docket No. FHWA–99–5899]

RIN 2125–AE65

Intelligent Transportation System Architecture and Standards

AGENCY: Federal Highway Administration (FHWA), DOT.

ACTION: Final rule.

SUMMARY: The purpose of this document is to issue a final rule to implement section 5206(e) of the Transportation Equity Act for the 21st Century (TEA–21), enacted on June 9, 1998, which required Intelligent Transportation System (ITS) projects funded through the highway trust fund to conform to the National ITS Architecture and applicable standards. Because it is highly unlikely that the entire National ITS Architecture would be fully implemented by any single metropolitan area or State, this rule requires that the National ITS Architecture be used to develop a local implementation of the National ITS Architecture, which is referred to as a ''regional ITS architecture.'' Therefore, conformance with the National ITS Architecture is defined under this rule as development of a regional ITS architecture within four years after the first ITS project advancing to final design, and the subsequent adherence of ITS projects to the regional ITS architecture. The regional ITS architecture is based on the National ITS Architecture and consist of several parts including the system functional requirements and information exchanges with planned and existing systems and subsystems and identification of applicable standards, and would be tailored to address the local situation and ITS investment needs.

EFFECTIVE DATE: February 7, 2001.

FOR FURTHER INFORMATION CONTACT: *For technical information:* Mr. Bob Rupert, (202) 366–2194, Office of Travel Management (HOTM–1) and Mr. Michael Freitas, (202) 366–9292, ITS Joint Program Office (HOIT–1). *For legal information:* Mr. Wilbert Baccus, Office of the Chief Counsel (HCC–32), (202) 366–1346, Federal Highway Administration, 400 Seventh Street, SW., Washington, DC 20590. Office hours are from 8 a.m. to 4:30 p.m., e.t., Monday through Friday, except Federal holidays.

SUPPLEMENTARY INFORMATION:

Electronic Access and Filing

You may submit or retrieve comments online through the Docket Management System (DMS) at: *http//dmses.dot.gov/submit.* Acceptable formats include: MS Word (versions 95 to 97), MS Word for Mac (versions 6 to 8), Rich Text Format (RTF), American Standard Code Information Interchange (ASCII) (TXT), Portable Document Format (PDF), and WordPerfect (version 7 to 8). The DMS is available 24 hours each day, 365 days each year. Electronic submission and retrieval help and guidelines are available under the help section of the web site.

An electronic copy of this document may be downloaded by using a computer, modem, and suitable communications software from the Government Printing Office's Electronic Bulletin Board Service at (202) 512–1661. Internet users may also reach the Office of the **Federal Register**'s home page at *http://www.nara.gov/fedreg* and the Government Printing Office's web page at: *http://www.access.gpo.gov/nara.* The document may also be viewed at the DOT's ITS web page at *http://www.its.dot.gov.*

Background

A notice of proposed rulemaking (NPRM) concerning this rule was published at 65 FR 33994 on May 25, 2000, and an extension of the comment period to September 23, 2000, was published at 65 FR 45942 on July 26, 2000.

In the NPRM on this rule, the FHWA had proposed that the regional ITS architecture follow from the ITS integration strategy proposed in another NPRM entitled ''Statewide Transportation Planning; Metropolitan Transportation Planning'' published at 65 FR 33922 on May 25, 2000. That rule is being developed according to a different schedule and will be issued separately. For this reason, all references to the proposed integration strategy have been removed from this rule. However, it is still the intent of this rule that regional ITS architectures be based on established, collaborative transportation planning processes. The other major changes to the final rule relate to options for developing a regional ITS architecture and the time allowed to develop such an architecture. Additional changes to the final rule largely deal with clarification of terms, improved language dealing with staging and grandfathering issues, and clarification of use of ITS standards.

Intelligent Transportation Systems represent the application of information processing, communications technologies, advanced control strategies, and electronics to the field of transportation. Information technology in general is most effective and cost beneficial when systems are integrated and interoperable. The greatest benefits in terms of safety, efficiency, and costs are realized when electronic systems are systematically integrated to form a whole in which information is shared with all and systems are interoperable.

In the transportation sector, successful ITS integration and interoperability require addressing two different and yet fundamental issues; that of technical and institutional integration. *Technical integration* of electronic systems is a complex issue that requires considerable up-front planning and meticulous execution for electronic information to be stored and accessed by various parts of a system. *Institutional integration* involves coordination between various agencies and jurisdictions to achieve seamless operations and/or interoperability.

In order to achieve effective institutional integration of systems, agencies and jurisdictions must agree on the benefits of ITS and the value of being part of an integrated system. They must agree on roles, responsibilities, and shared operational strategies. Finally, they must agree on standards and, in some cases, technologies and operating procedures to ensure interoperability. In some instances, there may be multiple standards that could be implemented for a single interface. In this case, agencies will need to agree on a common standard or agree to implement a technical translator that will allow dissimilar standards to interoperate. This coordination effort is a considerable task that will happen over time, not all at once. Transportation organizations, such as, transit properties, State and local transportation agencies, and metropolitan planning organizations must be fully committed to achieving institutional integration in order for integration to be successful. The transportation agencies must also coordinate with agencies for which transportation is a key, but not a primary part of their business, such as, emergency management and law enforcement agencies.

Successfully dealing with both the technical and institutional issues requires a high-level conceptual view of the future system and careful, comprehensive planning. The framework for the system is referred to as the *architecture.* The architecture defines the system components, key functions, the organizations involved, and the type of information shared

between organizations and parts of the system. The architecture is, therefore, fundamental to successful system implementation, integration, and interoperability.

Additional background information may be found in docket number FHWA–99–5899.

The National ITS Architecture

The Intermodal Surface Transportation Efficiency Act of 1991, Public Law 102–240, 105 Stat. 1914, initiated Federal funding for the ITS program. The program at that time was largely focused on research and development and operational tests of technologies. A key part of the program was the development of the National ITS Architecture. The National ITS Architecture provides a common structure for the design of ITS systems. The architecture defines the functions that could be performed to satisfy user requirements and how the various elements of the system might connect to share information. It is not a system design, nor is it a design concept. However, it does define the framework around which multiple design approaches can be developed, each one specifically tailored to meet the needs of the user, while maintaining the benefits of a common approach.

The National ITS Architecture, Version 3.0 can be obtained from the ITS Joint Program Office of the DOT in CD–ROM format and on the ITS web site *http://www.its.dot.gov*. The effort to develop a common national system architecture to guide the evolution of ITS in the United States over the next 20 years and beyond has been managed since September 1993 by the DOT. The National ITS Architecture describes in detail what types of interfaces should exist between ITS components and how they will exchange information and work together to deliver the given ITS user service requirements.

The National ITS Architecture and standards can be used to guide multi-level government and private-sector business planners in developing and deploying nationally compatible systems. By ensuring system compatibility, the DOT hopes to accelerate ITS integration nationwide and develop a strong, diverse marketplace for related products and services.

It is highly unlikely that the entire National ITS Architecture will be fully implemented by any single metropolitan area or State. For example, the National ITS Architecture contains information flows for an Automated Highway System that is unlikely to be part of most regional implementations. However, the National ITS Architecture has considerable value as a framework for local governments in the development of regional ITS architectures by identifying the many functions and information sharing opportunities that may be desired. It can assist local governments with both of the key elements: technical interoperability and institutional coordination.

The National ITS Architecture, because it aids in the development of a high-level conceptual view of a future system, can assist local governments in identifying applications that will support their future transportation needs. From an institutional coordination perspective, the National ITS Architecture helps local transportation planners to identify other stakeholders who may need to be involved and to identify potential integration opportunities. From a technical interoperability perspective, the National ITS Architecture provides a logical and physical architecture and process specifications to guide the design of a system. The National ITS Architecture also identifies interfaces where standards may apply, further supporting interoperability.

Transportation Equity Act for the 21st Century

As noted above, section 5206(e) of the TEA–21, Public Law 105–178, 112 Stat. 457, requires ITS projects funded from the highway trust fund to conform to the National ITS Architecture, applicable or provisional standards, and protocols. One of the findings of Congress in section 5202 of the TEA–21, is that continued investment in systems integration is needed to accelerate the rate at which ITS is incorporated into the national surface transportation network. Two of the purposes of the ITS program, noted in section 5203(b) of the TEA–21, are to expedite the deployment and integration of ITS, and to improve regional cooperation and operations planning for effective ITS deployment. Use of the National ITS Architecture provides significant benefits to local transportation planners and deployers as follows:

1. The National ITS Architecture provides assistance with technical design. It saves considerable design time because physical and logical architectures are already defined.

2. Information flows and process specifications are defined in the National ITS Architecture, allowing local governments to accelerate the process of defining system functionality.

3. The architecture identifies standards that will support interoperability now and into the future, but it leaves selection of technologies to local decisionmakers.

4. The architecture provides a sound engineering framework for integrating multiple applications and services in a region.

ITS Architecture and Standards NPRM

Discussion of Comments

The FHWA received 105 comments on this docket from a wide range of stakeholders, including major industry associations, State departments of transportation, Metropolitan Planning Organizations (MPOs), and local agencies. The comments were generally favorable about the scope and content, but requested additional clarification and guidance on implementation of specific items. On many issues, some commenters wanted more specific requirements, while others wanted more flexibility. Most commenters, including major industry associations and public sector agencies, agreed with the overall scope, but some felt that the specifics might be difficult to implement and asked for clarification of key terms. A few commenters wanted the FHWA to reduce the number of requirements or convert the rulemaking into a guidance activity until more ITS deployment experience is gained.

In summary, the FHWA received a large number of generally favorable comments about the NPRM that suggested minor specific changes and expressed a need for further guidance on implementation. Since the general tenor of the comments was positive, the FHWA has kept the scope of the NPRM and made appropriate clarifications to the text of the final rule to address concerns raised in comments. In response to the many comments requesting it, starting in early 2001, the FHWA will also provide a program of guidance, training, and technical support to assist with the implementation of this rule. The following is a detailed discussion of the comments and their disposition, organized by subject matter.

Section 940.3 Definitions

ITS Project. There were 34 comments submitted to the docket concerning the definition of an ITS project. Many of the commenters felt the definition was not clear enough, was too broad, or was too subject to interpretation. Some comments questioned how much of a project's budget would have to be spent on ITS before a project would be considered an ITS project. Some suggested specific language to more narrowly define an ITS project by

focusing on the portion of the overall project that is actually ITS or by suggesting language that would narrow the definition of an ITS project to only include projects which introduce new or changed integration opportunities.

Since the intent of this rule and the supporting legislation is to facilitate the deployment of integrated ITS systems, it is the position of the FHWA that the definition of an ITS project must be fairly broad to include any ITS system being funded with highway trust fund dollars. It is only by properly considering all planned ITS investments in the development of a regional ITS architecture that the integration opportunities and needs can even be identified. This consideration should be carried out in the development of an architecture prior to the specific project being advanced. If, in the development of a regional ITS architecture, it is determined that a specific planned project offers no real integration opportunities for the region, then the impact of this rule on that specific project is minimal.

As a response to the comments concerning the clarity of the definition, the definition of an ITS project has been slightly modified to remove the examples since they were considered misleading. The FHWA recognizes that any definition will be subject to interpretation by the stakeholders and acknowledges the need for guidance in this area to ensure clear and consistent interpretation of this rule. Guidance on what constitutes an ITS project (including examples) will be developed to assist the various stakeholders, including the FHWA Division Offices, to better understand what projects should be considered ITS projects.

Region. There were 26 comments submitted related to the definition of a region. Seven comments supported the open definition provided in the NPRM, arguing that the possible integration opportunities in an area should define the region and that there were too many possible variations to allow a restrictive definition. Six commenters who expressed concern over varying conditions interpreted the definition to mean Metropolitan Planning Area (MPA). Five comments suggested an MPA was too restrictive. Eight other comments indicated that the proposed definition of a region did not clearly identify what entity would have the lead in developing a regional ITS architecture or thought the definition implied the MPO should have the lead. Nine comments suggested various limits or boundaries to fit specific situations. Ten comments expressed a need for greater clarification of the definition for a region.

The intent of the proposed definition was to allow considerable flexibility on the part of the stakeholders in defining the boundaries of a region to best meet their identified integration opportunities. While there was no intent to generally restrict the definition to MPAs or States, the FHWA determined that regional ITS architectures should be based on an integration strategy that was developed by an MPO or State as part of its transportation planning process.

Given that the final rule does not require or reference an integration strategy, the FHWA feels a need to provide more specific guidance on the definition of a region. As such, the definition of a region has been revised to indicate that the MPA should be the minimum area considered when establishing the boundaries of a region for purposes of developing a regional ITS architecture within a metropolitan area. This should not be interpreted to mean that a region must be an MPA, or no less than an MPA, but the MPA and all the agencies and jurisdictions within the MPA should be at least considered for inclusion in the process of developing a regional ITS architecture within a metropolitan area. This rule is silent on other possible limits or minimum areas for defining a region, relying on the flexible nature of this rule to accommodate those special circumstances. The FHWA also acknowledges it is possible that overlapping regions could be defined and overlapping regional ITS architectures be developed to meet the needs of the regions.

Other Definitions. There were 20 comments suggesting that other terms used in the NPRM be defined. These included ''interoperability,'' ''standards,'' ''concept of operations,'' ''conceptual design,'' and ''integration strategy.'' Several of these are no longer used in the final rule and, therefore, were not defined. Other terms, such as ''interoperability'' and ''standards,'' were determined to be common terms whose definition did not effect the implementation of the final rule. Furthermore, language regarding standards conformity has been clarified in the body of the final rule.

Section 940.5 Policy

Twenty-eight commenters addressed the issue of consistency between the two related FHWA notices of proposed rulemaking (23 CFR parts 940 and 1410) and the Federal Transit Administration's (FTA) notice (FTA Docket No. FTA–99–6417) on National ITS Architecture published at 65 FR 34002 on May 25, 2000. The comments revealed a lack of understanding about the relationship between the regional ITS architecture and the integration strategy proposed as part of the revisions to FHWA's transportation planning rules. There were five comments suggesting a single DOT rule addressing how all ITS projects would meet the National ITS Architecture conformance requirements of the TEA–21 instead of an FHWA rule for highway projects and an FTA policy for transit projects. Four other comments acknowledged the need for two policies, but recommended they articulate the same process.

A final transportation planning rule is being developed on a different schedule than this rule, and comments regarding the portions of the National ITS Architecture conformity process included in the transportation planning rule will be addressed as it proceeds toward issuance. The FHWA and FTA have chosen to go forward with policies that have been developed cooperatively to implement the National ITS Architecture conformance process. This FHWA rule and the parallel FTA policy have been developed without reference to the proposed changes to the transportation planning process, including no mention of the development of an integration strategy. However, the policy statement of this rule notes a link to established transportation planning processes, as provided under 23 CFR part 450. This rule fully supports these collaborative methods for establishing transportation goals and objectives, and does not provide a mechanism for introducing projects outside of the transportation planning processes.

This final rule on National ITS Architecture conformance and the FTA policy on the same subject have been developed cooperatively and coordinated among the agencies to ensure compatible processes. Any differences between this rule and the parallel FTA policy are intended to address differences in highway and transit project development and the way the FHWA and the FTA administer projects and funds.

Fifteen commenters questioned the need for an integration strategy, and the relationship between the strategy and the regional ITS architecture.

Given the fact that proposed revisions to the FHWA's transportation planning rules are being developed according to a different schedule, this rule has been revised to remove any references to an integration strategy. Comments regarding the integration strategy will be addressed in the final transportation

planning rule, and the discussion of the regional ITS architecture in § 940.9 has been revised to clarify its content.

Section 940.7 Applicability

A few commenters noted that the proposed rule had not addressed the TEA–21 language that allows for the Secretary to authorize certain exceptions to the conformity provision. These exceptions relate to those projects designed to achieve specific research objectives or, if three stated criteria are met, to those intended to upgrade or expand an ITS system in existence on the date of enactment of the TEA–21. The legislation also included a general exemption for funds used strictly for operations and maintenance of an ITS system in existence on the date of enactment of the TEA–21.

The FHWA acknowledges this omission and has included the appropriate language in this section of the rule.

Section 940.9 Regional ITS Architecture

Several comments were received related to the way the proposed rule referred to developing regional ITS architectures. Eight comments, from State agencies and metropolitan planning organizations, supported an incremental approach to developing regional ITS architectures, starting with project ITS architectures and building them together. Four other comments, from metropolitan planning organizations and industry associations, noted that an ad hoc regional ITS architecture developed incrementally through projects would result in an architecture less robust than if there were a single, initial effort to develop it.

Also, thirteen comments from the Association of American State Highway and Transportation Officials (AASHTO) and a number of States recommended extending the time for developing regional ITS architectures, as the proposed two year implementation would be too short. Ten of the commenters preferred four years in order to acquire the necessary resources for developing regional ITS architectures.

Most commenters were in agreement with the content of the regional ITS architecture as defined in the proposed rule. However, there were 19 comments that dealt with confusion over the definition of both ''conceptual design'' and ''concept of operations.'' In addition, there were 17 other comments on the makeup of the stakeholders, involvement of the private sector, and the need and desirability of ''agreements'' between stakeholders.

The comments indicated confusion regarding the development of regional ITS architectures, and especially so in discussing the period of time for their development. Therefore, the final rule has clarified the time period for developing regional ITS architectures by adopting the proposed extension to four years subsequent to beginning to deploy ITS projects (§ 940.9(c)), or four years from the effective date of this rule for those areas that are currently deploying ITS projects (§ 940.9(b)). In clarifying the time for development, this rule has eliminated any references to specific methods for developing regional ITS architectures. By not prescribing any methods, the rule provides flexibility to a region in deciding how it should develop its regional ITS architecture. Guidance and information related to developing regional ITS architectures is available from FHWA Division Offices and from the ITS web site, *http://www.its.dot.gov*, and will be expanded to provide assistance in meeting the intent of the rule.

Both the terms ''conceptual design'' and ''concept of operations'' have been deleted from the final rule. In their stead are descriptions of the content that is expected to form the basis for a regional ITS architecture. This content has not significantly changed from that defined in the NPRM but is now contained in § 940.9(d). The level of detail required is to the architecture flow level as defined in the National ITS Architecture. The regional ITS architecture must identify how agencies, modes, and systems will interact and operate if the architecture is to fulfill the objective of promoting ITS integration within a region.

The relevant stakeholders for a region will vary from region to region. The list articulated in § 940.9(a) is representative only and not meant to be inclusive or exclusive. On the specific issue of private sector participation, if the private sector is deploying ITS systems in a region or otherwise providing an ITS-based service, it would be appropriate to engage them in the development of a regional ITS architecture. Because of these variations from region to region, the FHWA felt it inappropriate to attempt to define an all inclusive list of stakeholders. The group of relevant stakeholders will be a function of how the region is defined and how transportation services are provided to the public. Section 940.9(d)(4) specifies that in the development of the regional ITS architecture, it shall include ''any agreements (existing or new) required for operations.'' The formalization of these types of agreements is at the discretion of the region and participating stakeholders.

There were 14 comments from a broad range of organizations questioning how existing regional ITS architectures, strategic plans or ITS Early Deployment Plans would be treated under this rule. It is the intent of the FHWA that any existing ITS planning documents should be used to the extent practical to meet the requirements of this rule. If a regional ITS architecture is in place, is up to date, and addresses all the requirements of a regional ITS architecture as described in this rule, there is no requirement to develop a ''new'' one. If the existing regional ITS architecture does not address all the requirements of the rule, it may be possible to update it so that it meets the regional ITS architecture requirements of this rule. What is necessary is that the end result is an architecture that meets the requirements of this rule and properly addresses the ITS deployments and integration opportunities of that region. This issue is specifically addressed in § 940.9(e) of this rule.

There were five comments related to the impact of this rule on legacy systems (*i.e.*, ITS systems already in place) and requesting some sort of ''grandfathering'' for them. The language in § 940.11(g) of the final rule clarifies the grandfathering or staging aspects of the process. The final rule does not require any changes or modifications to existing systems to conform to the National ITS Architecture. It is very likely that a regional ITS architecture developed by the local agencies and other stakeholders would call for changes to legacy systems over time to support desired integration. However, such changes would not be required by the FHWA; they would be agreed upon by the appropriate stakeholders as part of the development of the regional ITS architecture.

There were 15 comments dealing with the maintenance process and status of the National ITS Architecture. Two comments suggested the need for the FHWA to formally adopt the National ITS Architecture. Four other comments also supported the formalization of a process for maintaining or updating it with the full opportunity for public input.

Conformance with the National ITS Architecture is interpreted to mean the use of the National ITS Architecture to develop a regional ITS architecture, and the subsequent adherence of all ITS projects to that regional ITS architecture. This rule requires that the National ITS Architecture be used as a resource in developing a regional ITS architecture.

As a technical resource, it is important that the National ITS Architecture be maintained and updated as necessary in response to user input or to add new user services, but formal adoption of the National ITS Architecture is not necessary. However, the FHWA recognizes the need to maintain the National ITS Architecture and to establish an open process for configuration control that includes public participation. The process currently used by the DOT to maintain the National ITS Architecture is very rigorous and involves significant public participation. That process is currently being reviewed by the DOT with the intent of establishing a configuration management process that engages the public at key stages and ensures a consensus for updating the National ITS Architecture.

Four comments suggested that this rule should not be implemented until the National ITS Architecture was complete. The National ITS Architecture will never stop evolving since there always is a potential need to regularly update it as more is learned about ITS deployment. The FHWA believes the National ITS Architecture is developed to a stage where it can be used as a resource in developing regional ITS architectures, as required by this rule.

Seventeen comments asked the FHWA to define the agency that is responsible for the development and maintenance of the regional ITS architecture; specifically MPOs and/or the State as those entities that are already responsible for the planning process.

The FHWA did not define the responsibility for either creating or maintaining the regional ITS architecture to a specific entity because of the diversity of transportation agencies and their roles across the country. It is recognized that in some regions traditional State and MPO boundaries may not meet the needs of the traveling public or the transportation community. This is also why the FHWA did not rigidly define a region. The FHWA encourages MPOs and States to include the development of their regional ITS architectures as part of their transportation planning processes. However, the decision is best left to the region to determine the approach that best reflects their needs, as indicated in § 940.9. It is clear that the value of a regional ITS architecture will only be realized if that architecture is maintained through time. However, in accepting Federal funds under title 23, U.S.C., the State is ultimately responsible for complying with Federal requirements, as provided in 23 U.S.C. 106 and 133.

Four commenters noted that the proposed rule did not adequately address planning for, or committing to, a defined level of operations and maintenance.

The final rule addresses this concern on two primary levels, in the development of the regional ITS architecture and the development of individual projects. Section 940.9(d)(4) specifies that in the development of the regional ITS architecture, it shall include ''any agreements (existing or new) required for operations.'' The formalization of these types of agreements is at the discretion of the region and participating stakeholders.

Also, relative to operations and management at a project level, § 940.11(c)(7) specifies that the systems engineering analysis (required of all ITS projects) includes ''procedures and resources necessary for the operations and management of the system.''

Section 940.11 Project Implementation

In addition to the comments on regional ITS architecture development noted above, the docket received 86 comments on systems engineering and project implementation. These comments revealed that the structure of the NPRM in discussing regional ITS architecture development, project systems engineering analysis, and project implementation was confusing and difficult to read.

To clarify these portions of the rule, the systems engineering and project implementation sections of the NPRM have been combined into § 940.11, Project Implementation. Also, paragraphs that were in the regional ITS architecture section of the NPRM that discussed major ITS projects and the requirements for developing project level ITS architectures have been rewritten to clarify their applicability. Since these paragraphs deal with project development issues, they have been moved to § 940.11(e). A definition for ''project level ITS architecture'' was added in § 940.3 and a description of its contents provided in § 940.11(e).

The docket received 33 comments regarding systems engineering and the systems engineering analysis section of the proposed rule. Most of the comments related to the definition, the process not being necessary except for very large projects, and confusion as to how these requirements relate to existing FHWA policy.

In response to the docket comments, the definition of systems engineering in § 940.3 has been clarified and is more consistent with accepted practice. In order to provide consistency in the regional ITS architecture process, the systems engineering analysis detailed in §§ 940.11(a) through 940.11(c) must apply to all ITS projects regardless of size or budget. However, the analysis should be on a scale commensurate with project scope. To allow for the greatest flexibility at the State and local level, in § 940.11(c), a minimum number of elements have been clearly identified for inclusion in the systems engineering analysis. Many of those elements are currently required as provided in 23 CFR 655.409, which this rule replaces. Recognizing the change in some current practices this type of analysis will require, the FHWA intends to issue guidance, training, and technical support in early 2001 to help stakeholders meet the requirements of the final rule.

Fifty-three comments were submitted regarding ITS standards and interoperability tests. The commenters expressed concern about requiring the use of ITS standards and interoperability tests prematurely, the impact on legacy systems of requiring ITS standards, and confusion regarding the term ''adopted by the DOT.''

In response to the comments, the FHWA has significantly modified the final rule to eliminate reference to the use of standards and interoperability tests prior to adoption in § 940.11(f). Section 940.11(g) addresses the applicability of standards to legacy systems. It is not the intent of the DOT to formally adopt any standard before the standard is mature; and also, not all ITS standards should, or will, be formally adopted by the DOT. Formal adoption of a standard means that the DOT will go through the rulemaking process, including a period of public comment, for all standards that are considered candidates for adoption.

The DOT has developed a set of criteria to determine when a standard could be considered for formal adoption. These criteria include, at a minimum, the following elements:

1. The standard has been approved by a Standard Development Organization (SDO).

2. The standard has been successfully tested in real world applications as appropriate.

3. The standard has received some degree of acceptance by the community served by the standard.

4. Products exist to implement the standard.

5. There is adequate documentation to support the use of the standard.

6. There is training available in the use of the standard where applicable.

Therefore, the intent of the rule is to require the use of a standard only when these criteria have been met, and there has been a separate rulemaking on adoption of the standard.

The only interoperability tests that are currently contemplated by the DOT are those associated with the Commercial Vehicle Operations (CVO) program. These tests are currently being used by States deploying CVO systems and will follow a similar set of criteria for adoption as those defined for standards.

Section 940.13 Project Administration

There were nine comments related to how conformity with the final rule would be determined, and by whom. There were 11 comments about how conformity with the regional ITS architecture would be determined, and by whom. Six comments specifically suggested methods for determining conformance, including a process similar to current Federal planning oversight procedures. Six other commenters suggested that determination be made by the MPO or State. For either case, the comments reflected a lack of clarity as to what documentation would be necessary. There were six related comments suggesting the level of documentation be commensurate with the scale of the planned ITS investments in the region.

In § 940.13 of the final rule, the FHWA has attempted to clarify the process for determining conformance. Conformance of an ITS project with a regional ITS architecture shall be made prior to authorization of funding for project construction or implementation as provided in 23 U.S.C. 106 and 133. We do not intend to create new oversight procedures beyond those provided in 23 U.S.C. 106 and 133, but in those cases where oversight and approval for ITS projects is assumed by the State, the State will be responsible for ensuring compliance with this regulation and the FHWA's oversight will be through existing processes.

There were 14 comments concerning the documentation requirements of the proposed rule and generally suggesting they be reduced. Certainly the development of a regional ITS architecture and evidence of conformance of a specific project to that regional ITS architecture implies some level of documentation be developed. However, to allow flexibility on the part of the State or local agency in demonstrating compliance with the final rule, no specific documentation is required to be developed or submitted to the FHWA for review or approval. The FHWA recognizes the need to be able to scale the regional ITS architecture and the associated documentation to the needs of the region. Section 940.9(a) of the final rule contains specific language allowing such scaling.

Summary of Requirements

I. The Regional ITS Architecture

This final rule on the ITS Architecture and Standards requires the development of a local implementation of the National ITS Architecture referred to as a regional ITS architecture. The regional ITS architecture is tailored to meet local needs, meaning that it does not address the entire National ITS Architecture and can also address services not included in the National ITS Architecture. The regional ITS architecture shall contain a description of the region and the identification of the participating agencies and other stakeholders; the roles and responsibilities of the participating agencies and other stakeholders; any agreements needed for operation; system functional requirements; interface requirements and information exchanges with planned and existing systems; identification of applicable standards; and the sequence of projects necessary for implementation. Any changes made in a project design that impact the regional ITS architecture shall be identified and the appropriate revisions made and agreed to in the regional ITS architecture.

Any region that is currently implementing ITS projects shall have a regional ITS architecture within four years of the effective date of this rule. All other regions not currently implementing ITS projects shall have a regional ITS architecture within four years of the first ITS project for that region advancing to final design. In this context, a region is a geographical area that is based on local needs for sharing information and coordinating operational strategies among multiple projects. A region can be specified at a metropolitan, Statewide, multi-State, or corridor level. Within a metropolitan area, the metropolitan planning area should be the minimum area that is considered when establishing the boundaries of a region for purposes of developing a regional ITS architecture. A regional approach promotes integration of transportation systems. The size of the region should reflect the breadth of the integration of transportation systems.

II. Project Development

Additionally, this rule requires that all ITS projects be developed using a systems engineering analysis. All ITS projects that have not yet advanced to final design are required to conform to the system engineering requirements in § 940.11 upon the effective date of this rule. Any ITS project that has advanced to final design by the effective date of this rule is exempt from the requirements of § 940.11. When the regional ITS architecture is completed, project development will be based on the relevant portions of it which the project implements. Prior to completion of the regional ITS architecture, major ITS projects will develop project level ITS architectures that are coordinated with the development of the regional ITS architecture. ITS projects will be required to use applicable ITS standards and interoperability tests that have been officially adopted by the DOT. Where multiple standards exist, it will be the responsibility of the stakeholders to determine how best to achieve the interoperability they desire.

Rulemaking Analyses and Notices

Executive Order 12866 (Regulatory Planning and Review) and DOT Regulatory Policies and Procedures

The FHWA has determined that this action is not a significant regulatory action within the meaning of Executive Order 12866 or significant within the meaning of the Department of Transportation's regulatory policies and procedures. It is anticipated that the economic impact of this rulemaking will be minimal. This determination is based upon preliminary and final regulatory assessments prepared for this action that indicate that the annual impact of the rule will not exceed $100 million nor will it adversely affect the economy, a sector of the economy, productivity, jobs, the environment, public health, safety, or State, local, or tribal governments. In addition, the agency has determined that these changes will not interfere with any action taken or planned by another agency and will not materially alter the budgetary impact of any entitlements, grants, user fees, or loan programs. Copies of the preliminary and final regulatory assessments are included in the docket.

Costs

The FHWA prepared a preliminary regulatory evaluation (PRE) for the NPRM and comments were solicited. That analysis estimated the total costs of this rule over 10 years to be between $38.1 million and $44.4 million (the net present value over 10 years was between $22.3 million and $31.2 million). The annual constant dollar impact was estimated to range between $3.2 million and $4.4 million. We believe that the

cost estimates as stated in the PRE are negligible. The FHWA received only one comment in response to the PRE. That commenter, the Capital District Transportation Committee of Albany, New York suggested that our cost estimates were too low, but provided no further detail or rationale which would cause us to reconsider or increase our cost estimates in the initial regulatory evaluation.

These 10-year cost estimates set forth in the PRE included transportation planning cost increases, to MPOs ranging from $10.8 million to $13.5 million, and to States from $5.2 million to $7.8 million associated with our initial requirement to develop an ITS integration strategy that was proposed as part of the metropolitan and statewide planning rulemaking effort. The agency now plans to advance that proposed ITS integration strategy in the planning rule on a different time schedule than this final rule. Thus, the costs originally set forth in the PRE for the ITS integration strategy have been eliminated from the final cost estimate in the final regulatory evaluation (FRE) for this rule.

In the FRE, the agency estimates the cost of this rule to be between $1 million an $16 million over ten years, which are the estimated costs of this rule to implementing agencies for the development of the regional ITS architectures. These costs do not include any potential additional implementation costs for individual projects which are expected to be minimal and were extremely difficult to estimate. Thus, the costs to the industry are less than that originally estimated in the agency's NPRM.

Benefits

In the PRE, the FHWA indicated that the non-monetary benefits derived from the proposed action included savings from the avoidance of duplicative development, reduced overall development time, and earlier detection of potential incompatibilities. We stated that, as with project implementation impacts, the benefits of the rule are very difficult to quantify in monetary terms. Thus, we estimated that the coordination guidance provided through implementation of the rule could provide savings of approximately $150,000 to any potential entity seeking to comply with the requirements of section 5206(e) of the TEA–21 as compared with an entity having to undertake compliance individually. The costs may be offset by benefits derived from the reduction of duplicative deployments, reduced overall development time, and earlier detection of potential incompatibilities.

In developing a final regulatory evaluation for this action, we did not denote a significant change in any of the benefits anticipated by this rule. This is so notwithstanding the fact that our planning costs for the ITS integration strategy have been eliminated from the final cost estimate. The primary benefits of this action that result from avoidance of duplicative development, reduced overall development time, and earlier detection of potential incompatibilities will remain the same.

In sum the agency believes that the option chosen in this action will be most effective at helping us to implement the requirements of section 5206(e) of the TEA–21. In developing the rule, the FHWA has sought to allow broad discretion to those entities impacted, in levels of response and approach that are appropriate to particular plans and projects, while conforming to the requirements of the TEA–21. The FHWA has considered the costs and benefits of effective implementation of ITS through careful and comprehensive planning. Based upon the information above, the agency anticipates that the economic impact associated with this rulemaking action is minimal and a full regulatory evaluation is not necessary.

Regulatory Flexibility Act

In compliance with the Regulatory Flexibility Act (5 U.S.C. 601–612), the FHWA has evaluated, through the regulatory assessment, the effects of this action on small entities and has determined that this action will not have a significant economic impact on a substantial number of small entities. Small businesses and small organizations are not subject to this rule, which applies to government entities only. Since § 940.9(a) of this rule provides for regional ITS architectures to be developed on a scale commensurate with the scope of ITS investment in the region, and § 940.11(b) provides for the ITS project systems engineering analysis to be on a scale commensurate with the project scope, compliance requirements will vary with the magnitude of the ITS requirements of the entity. Small, less complex ITS projects have correspondingly small compliance documentation requirements, thereby accommodating the interest of small government entities. Small entities, primarily transit agencies, are accommodated through these scaling provisions that impose only limited requirements on small ITS activities. For these reasons, the FHWA certifies that this action will not have a significant impact on a substantial number of small entities.

Unfunded Mandates Reform Act of 1995

This action does not impose unfunded mandates as defined by the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4, March 22, 1995, 109 Stat. 48). This rule will not result in an expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more in any one year.

Executive Order 13132 (Federalism)

This action has been analyzed in accordance with the principles and criteria contained in Executive Order 13132, dated August 4, 1999, and the FHWA has determined that this action does not have sufficient federalism implications to warrant the preparation of a federalism assessment. The FHWA has also determined that this action does not preempt any State law or State regulation or affect the State's ability to discharge traditional State governmental functions.

Executive Order 12372 (Intergovernmental Review)

Catalog of Federal Domestic Assistance Program Number 20.205, Highway planning and construction. The regulations implementing Executive Order 12372 regarding intergovernmental consultation on Federal programs and activities apply to this program.

Paperwork Reduction Act of 1995

This action does not contain information collection requirements for the purposes of the Paperwork Reduction Act of 1995, 44 U.S.C. 3501–3520.

Executive Order 12988 (Civil Justice Reform)

This action meets applicable standards in sections 3(a) and 3(b)(2) of Executive Order 12988, Civil Justice Reform, to minimize litigation, eliminate ambiguity, and reduce burden.

Executive Order 13045 (Protection of Children)

We have analyzed this action under Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks. This rule is not an economically significant rule and does not concern an environmental risk to health or safety that may disproportionately affect children.

Executive Order 12630 (Taking of Private Property)

This rule does not effect a taking of private property or otherwise have taking implications under Executive Order 12630, Government Actions and Interference with Constitutionally Protected Property Rights.

National Environmental Policy Act

The agency has analyzed this action for the purposes of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321–4347), and has determined that this action will not have any effect on the quality of the environment.

Regulation Identification Number

A regulation identification number (RIN) is assigned to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. The RIN contained in the heading of this document can be used to cross reference this proposed action with the Unified Agenda.

List of Subjects

23 CFR Part 655

Design standards, Grant programs-transportation, Highways and roads, Incorporation by reference, Signs and symbols, Traffic regulations.

23 CFR Part 940

Design standards, Grant programs-transportation, Highways and roads, Intelligent transportation systems.

Issued on: January 2, 2001.

Kenneth R. Wykle,

Federal Highway Administrator.

In consideration of the foregoing, the FHWA amends Chapter I of title 23, Code of Federal Regulations, as set forth below:

PART 655—[AMENDED]

1. The authority citation for part 655 continues to read as follows:

Authority: 23 U.S.C. 101(a), 104, 109(d), 114(a), 217, 315, and 402(a); 23 CFR 1.32, and 49 CFR 1.48(b).

Subpart D—[Removed and reserved]

2. Remove and reserve subpart D of part 655, consisting of §§ 655.401, 655.403, 655.405, 655.407, 655.409, 655.411.

3. Add a new subchapter K, consisting of part 940, to read as follows:

Subchapter K—Intelligent Transportation Systems

PART 940—INTELLIGENT TRANSPORTATION SYSTEM ARCHITECTURE AND STANDARDS

Sec.

940.1 Purpose.
940.3 Definitions.
940.5 Policy.
940.7 Applicability.
940.9 Regional ITS architecture.
940.11 Project implementation.
940.13 Project administration.

Authority: 23 U.S.C. 101, 106, 109, 133, 315, and 508; sec 5206(e), Public Law 105–178, 112 Stat. 457 (23 U.S.C. 502 note); and 49 CFR 1.48.

§ 940.1 Purpose.

This regulation provides policies and procedures for implementing section 5206(e) of the Transportation Equity Act for the 21st Century (TEA–21), Public Law 105–178, 112 Stat. 457, pertaining to conformance with the National Intelligent Transportation Systems Architecture and Standards.

§ 940.3 Definitions.

Intelligent Transportation System (ITS) means electronics, communications, or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system.

ITS project means any project that in whole or in part funds the acquisition of technologies or systems of technologies that provide or significantly contribute to the provision of one or more ITS user services as defined in the National ITS Architecture.

Major ITS project means any ITS project that implements part of a regional ITS initiative that is multi-jurisdictional, multi-modal, or otherwise affects regional integration of ITS systems.

National ITS Architecture (also ''national architecture'') means a common framework for ITS interoperability. The National ITS Architecture comprises the logical architecture and physical architecture which satisfy a defined set of user services. The National ITS Architecture is maintained by the United States Department of Transportation (DOT) and is available on the DOT web site at *http://www.its.dot.gov.*

Project level ITS architecture is a framework that identifies the institutional agreement and technical integration necessary to interface a major ITS project with other ITS projects and systems.

Region is the geographical area that identifies the boundaries of the regional ITS architecture and is defined by and based on the needs of the participating agencies and other stakeholders. In metropolitan areas, a region should be no less than the boundaries of the metropolitan planning area.

Regional ITS architecture means a regional framework for ensuring institutional agreement and technical integration for the implementation of ITS projects or groups of projects.

Systems engineering is a structured process for arriving at a final design of a system. The final design is selected from a number of alternatives that would accomplish the same objectives and considers the total life-cycle of the project including not only the technical merits of potential solutions but also the costs and relative value of alternatives.

§ 940.5 Policy.

ITS projects shall conform to the National ITS Architecture and standards in accordance with the requirements contained in this part. Conformance with the National ITS Architecture is interpreted to mean the use of the National ITS Architecture to develop a regional ITS architecture, and the subsequent adherence of all ITS projects to that regional ITS architecture. Development of the regional ITS architecture should be consistent with the transportation planning process for Statewide and Metropolitan Transportation Planning.

§ 940.7 Applicability.

(a) All ITS projects that are funded in whole or in part with the highway trust fund, including those on the National Highway System (NHS) and on non-NHS facilities, are subject to these provisions.

(b) The Secretary may authorize exceptions for:

(1) Projects designed to achieve specific research objectives outlined in the National ITS Program Plan under section 5205 of the TEA–21, or the Surface Transportation Research and Development Strategic Plan developed under 23 U.S.C. 508; or

(2) The upgrade or expansion of an ITS system in existence on the date of enactment of the TEA–21, if the Secretary determines that the upgrade or expansion:

(i) Would not adversely affect the goals or purposes of Subtitle C (Intelligent Transportation Systems Act of 1998) of the TEA–21;

(ii) Is carried out before the end of the useful life of such system; and

(iii) Is cost-effective as compared to alternatives that would meet the conformity requirement of this rule.

(c) These provisions do not apply to funds used for operations and maintenance of an ITS system in existence on June 9, 1998.

§ 940.9 Regional ITS architecture.

(a) A regional ITS architecture shall be developed to guide the development of ITS projects and programs and be consistent with ITS strategies and projects contained in applicable transportation plans. The National ITS Architecture shall be used as a resource in the development of the regional ITS architecture. The regional ITS architecture shall be on a scale commensurate with the scope of ITS investment in the region. Provision should be made to include participation from the following agencies, as appropriate, in the development of the regional ITS architecture: Highway agencies; public safety agencies (*e.g.,* police, fire, emergency/medical); transit operators; Federal lands agencies; State motor carrier agencies; and other operating agencies necessary to fully address regional ITS integration.

(b) Any region that is currently implementing ITS projects shall have a regional ITS architecture by February 7, 2005.

(c) All other regions not currently implementing ITS projects shall have a regional ITS architecture within four years of the first ITS project for that region advancing to final design.

(d) The regional ITS architecture shall include, at a minimum, the following:

(1) A description of the region;

(2) Identification of participating agencies and other stakeholders;

(3) An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the systems included in the regional ITS architecture;

(4) Any agreements (existing or new) required for operations, including at a minimum those affecting ITS project interoperability, utilization of ITS related standards, and the operation of the projects identified in the regional ITS architecture;

(5) System functional requirements;

(6) Interface requirements and information exchanges with planned and existing systems and subsystems (for example, subsystems and architecture flows as defined in the National ITS Architecture);

(7) Identification of ITS standards supporting regional and national interoperability; and

(8) The sequence of projects required for implementation.

(e) Existing regional ITS architectures that meet all of the requirements of paragraph (d) of this section shall be considered to satisfy the requirements of paragraph (a) of this section.

(f) The agencies and other stakeholders participating in the development of the regional ITS architecture shall develop and implement procedures and responsibilities for maintaining it, as needs evolve within the region.

§ 940.11 Project implementation.

(a) All ITS projects funded with highway trust funds shall be based on a systems engineering analysis.

(b) The analysis should be on a scale commensurate with the project scope.

(c) The systems engineering analysis shall include, at a minimum:

(1) Identification of portions of the regional ITS architecture being implemented (or if a regional ITS architecture does not exist, the applicable portions of the National ITS Architecture);

(2) Identification of participating agencies roles and responsibilities;

(3) Requirements definitions;

(4) Analysis of alternative system configurations and technology options to meet requirements;

(5) Procurement options;

(6) Identification of applicable ITS standards and testing procedures; and

(7) Procedures and resources necessary for operations and management of the system.

(d) Upon completion of the regional ITS architecture required in §§ 940.9(b) or 940.9(c), the final design of all ITS projects funded with highway trust funds shall accommodate the interface requirements and information exchanges as specified in the regional ITS architecture. If the final design of the ITS project is inconsistent with the regional ITS architecture, then the regional ITS architecture shall be updated as provided in the process defined in § 940.9(f) to reflect the changes.

(e) Prior to the completion of the regional ITS architecture, any major ITS project funded with highway trust funds that advances to final design shall have a project level ITS architecture that is coordinated with the development of the regional ITS architecture. The final design of the major ITS project shall accommodate the interface requirements and information exchanges as specified in this project level ITS architecture. If the project final design is inconsistent with the project level ITS architecture, then the project level ITS architecture shall be updated to reflect the changes. The project level ITS architecture is based on the results of the systems engineering analysis, and includes the following:

(1) A description of the scope of the ITS project;

(2) An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the ITS project;

(3) Functional requirements of the ITS project;

(4) Interface requirements and information exchanges between the ITS project and other planned and existing systems and subsystems; and

(5) Identification of applicable ITS standards.

(f) All ITS projects funded with highway trust funds shall use applicable ITS standards and interoperability tests that have been officially adopted through rulemaking by the DOT.

(g) Any ITS project that has advanced to final design by February 7, 2001 is exempt from the requirements of paragraphs (d) through (f) of this section.

§ 940.13 Project administration.

(a) Prior to authorization of highway trust funds for construction or implementation of ITS projects, compliance with § 940.11 shall be demonstrated.

(b) Compliance with this part will be monitored under Federal-aid oversight procedures as provided under 23 U.S.C. 106 and 133.

[FR Doc. 01–391 Filed 1–5–01; 8:45 am]

BILLING CODE 4910–22–P

APPENDIX B

FEDERAL TRANSIT ADMINISTRATION NATIONAL ITS ARCHITECTURE POLICY ON TRANSIT PROJECTS

DEPARTMENT OF TRANSPORTATION

Federal Transit Administration

Federal Transit Administration National ITS Architecture Policy on Transit Projects

AGENCY: Federal Transit Administration (FTA), DOT.

ACTION: Notice.

SUMMARY: The Federal Transit Administration (FTA) announces the FTA National ITS Architecture Policy on Transit Projects, which is defined in this document. The National ITS Architecture Policy is a product of statutory changes made by the Transportation Equity Act for the 21st Century (TEA–21) (Pub. L. 105–178) enacted on June 9, 1998. The National ITS Architecture Policy is also a product of the Request for Comment on the National ITS Architecture Consistency Policy for Project Development that was published in the **Federal Register** on May 25, 2000. Because it is highly unlikely that the entire National ITS Architecture would be fully implemented by any single metropolitan area or State, this policy requires that the National ITS Architecture be used to develop a local implementation of the National ITS Architecture, which is referred to as a ''regional ITS architecture.'' Therefore, conformance with the National ITS Architecture is defined under this policy as development of a regional ITS architecture within four years after the first ITS project advancing to final design, and the subsequent adherence of ITS projects to the regional ITS architecture. The regional ITS architecture is based on the National ITS Architecture and consists of several parts including the system functional requirements and information exchanges with planned and existing systems and subsystems and identification of applicable standards, and would be tailored to address the local situation and ITS investment needs.

DATE: *Effective Date:* This policy is effective from February 7, 2001.

ADDRESSES: For FTA staff, Federal Transit Administration, Department of Transportation (DOT), 400 Seventh Street, SW., Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: *For Technical Information:* Ron Boenau, Chief, Advanced Public Transportation Systems Division (TRI–11), at (202) 366–0195 or Brian Cronin, Advanced Public Transportation Systems Division (TRI–11), at (202) 366–8841. *For Legal Information:* Richard Wong, Office of the Chief Council (202) 366–1936. The policy is posted on the FTA website on the Internet under http://www.fta.dot.gov.

Electronic Access: An electronic copy of this document may be downloaded using a computer, modem and suitable communications software from the Government Printing Office's Electronic Bulletin Board Service at (202) 512–1661. Internet users may reach the Office of the Federal Register's home page at: *http://www.nara.gov/fedreg* and the Government Printing Office's web page at: *http://www.access.gpo.gov/nara.*

Internet users may access all comments received by the U.S. DOT Dockets, Room PL–401, for the Request for Comment that was issued on May 25, 2000 which were used to clarify this Policy, by using the universal resource locator (URL): *http://dms.dot.gov.* It is available 24 hours each day, 365 days each year. Please follow the instructions online for more information and help. The docket number for the Request for Comment was FTA–99–6417.

SUPPLEMENTARY INFORMATION:

I. Background

The Federal Transit Administration (FTA) published a Request for Comment on May 25, 2000, to implement section 5206(e) of the Transportation Equity Act for the 21st Century (TEA–21) (Pub.L. 105–178), which was enacted on June 9, 1998.

Section 5206(e) of TEA–21 requires that the Secretary of the DOT must

> Ensure that intelligent transportation system projects carried out using funds made available from the Highway Trust Fund, * * * conform to the national architecture, applicable standards or provisional standards, and protocols developed under subsection(a).

The objectives for the FTA's National ITS Architecture Policy for Transit Projects are to:

- Provide requirements for ITS project development for projects implemented wholly or partially with highway trust funds.
- Achieve system integration of ITS projects funded through the highway trust fund with other transportation projects planned for the region, which will thereby enable electronic information and data sharing for advanced management and operations of the ITS infrastructure.
- Engage stakeholders (state DOT's, transit agencies, public safety agencies, other transportation operating agencies) in the project development and implementation process.
- Facilitate future expansion capability of the ITS infrastructure.
- Save design time through use of the National ITS Architecture requirements definitions and market packages.

FTA has developed this policy to meet the TEA–21 requirement contained in Section 5206(e) and the DOT/FTA goal to encourage effective deployment of ITS projects. Additionally, DOT and FTA encourage the coordination of local ITS strategies and projects to help meet national and local goals for mobility, accessibility, safety, security, economic growth and trade, and the environment.

The National ITS Architecture documents were developed by the US DOT, and are updated on an as-needed basis. Current work to update the National ITS Architecture is the Archive Data User Service, which provides the ability to store and process data over an extended period of time. FTA is pursuing the addition of a Rail ITS program for travel management, vehicles, and users. New versions of the documents, when they are issued, will be available from the US DOT on the DOT website at *www.its.dot.gov.* Version 3.0 is the latest version of the National ITS Architecture.

The first section of this policy contains a complete analysis of and response to the comments provided to the docket. The remainder of the Notice contains the FTA National ITS Architecture Policy for Transit Projects.

II. Public Comments

Eighteen comments were submitted to the FTA National ITS Architecture Consistency Policy for Project Development docket by the September 23, 2000, close of the comment period. Comments were submitted by transit operators (3), state and local governments (5), metropolitan planning organizations (4), industry associations (3), and consultants (3). As indicated earlier, a complete analysis and response to the docket comments is provided. In order to facilitate focused comments, FTA asked a series of questions about the policy. The public comment section is organized first by analysis and response to the specific questions asked; second by responses to comments not specifically related to one of the nine questions; and finally by an explanation of other changes. In general, the comments received were positive. Therefore, the FTA has kept the scope of the policy and made appropriate clarifications to the text of the policy to address concerns raised in comments. In response to the many comments requesting it, the FTA, in association with the ITS Joint Program Office, in the Federal Highway Administration (FHWA) will also provide a program of guidance, training, and technical

support to assist with the implementation of this policy.

Questions

1. Do reviewers understand the definition of a major ITS investment as defined in Section IV, ''Regional ITS Architecture,'' or is more clarification needed, and if so please explain?

Comments: Nine commenters submitted responses to this question. In general, commenters found the definition confusing, and did not understand why major ITS projects need to be called out over other ITS projects. One commenter noted that small dollar projects can have a major impact on future development, while an expensive system may have no impact. Another commenter was unclear about the term ''supporting national interoperability.''

Response: Of specific concern to the agency is the timing in which requirements for this policy are enacted. As such, the terms ''major ITS investment'' and ''major ITS project'' were provided so as to distinguish between projects that will require immediate correlation to the regional ITS architecture and those that do not. The term ''major ITS investment'' was also found to be redundant to ''major ITS project'' and was removed from the policy. Guidance on the classification of ''ITS projects'' and ''major ITS projects'' will be provided upon enactment of the policy.

2. Do reviewers understand the definition of an ITS project, or is more clarification needed, and if so please explain?

Comments: Nine commenters submitted responses to this question. Commenters found this term less confusing than ''major ITS investments,'' but requested more clarification. Some commenters proposed alternative language or asked for clarification on particular examples.

Response: The agency has clarified the definition by deleting the potentially ambiguous examples provided and will develop guidance material that provides examples of projects that will be considered ITS projects and those that will not be considered ITS projects. In general, unless a technology project is implementing one of the ITS user services defined in the National ITS Architecture, it would not be considered an ITS project.

3. Do reviewers understand the difference between a ''major ITS investment,'' and an ''ITS project'', or is more clarification needed, and if so please explain?

Comments: Eight commenters submitted responses to this question. Commenters had mixed responses, as some commenters found the differences to be clear, while others requested that guidance material be provided to further explain the differences. Commenters did suggest that a ''project'' is a ''project'' and should not be quantified in terms of dollar amounts.

Response: As described in the response to question 1, the agency has removed the term ''major ITS investment'' and will provide guidance on the term ''ITS project.''

4. Are the requirements for development of a Regional ITS Architecture clear? If not, what is not clear about the requirement?

Comment: Nine commenters provided responses to the question. Most commenters found the requirements to be unclear and/or did not agree with the requirements. One commenter suggested that a region will have different definitions. One commenter noted that a concept of operations and conceptual design are normally conducted at the project level. One commenter requested clarification as to the appropriate place to program projects, in the regional ITS architecture, or in the planning process.

Response: Of specific concern to the agency is providing a flexible policy that allows the transportation stakeholders to define their region and the roles and responsibilities of each stakeholder during the development of a regional ITS architecture. As such, the agency has clarified the requirements of a regional ITS architecture and also removed the specific requirements for a Concept of Operations and a Conceptual Design. Instead, the agency has listed the specific requirements for a regional ITS architecture and has left the development, documentation, and maintenance of the regional ITS architecture to the stakeholders involved. Also, the region is defined as ''a geographical area that is based on local needs for sharing information and coordinating operational strategies among multiple projects.'' A region can be specified at a metropolitan, Statewide, multi-State, or corridor level. Additional guidance on this topic will be provided after enactment of the policy.

5. What additional guidance, if any, is required to explain how to implement this proposed policy?

Comments: Ten commenters provided responses to this question. All the comments called for additional guidance on the specifics of implementing this policy. Commenters requested guidance on the definition of a ''region,'' the ownership of the regional ITS architecture, determination of stakeholders, regional ITS architecture maintenance, certification and simplification of definitions. One commenter requested that the policy be limited to only the ITS Integration Requirements defined in the Metropolitan and Statewide Planning NPRM.

Response: The agency will provide guidance materials to address the comments suggested. The ITS Integration Strategy, as defined in the NPRM, is part of the planning process and as such does not satisfactorily address project level requirements.

6. The proposed rule allows regions to develop a Regional Architecture as a separate activity, or incrementally, as major ITS investments are developed within a region. Do reviewers anticipate particular difficulties with implementing and documenting either approach?

Comments: Nine commenters provided responses to this question. Commenters largely did not favor one approach over the other. One commenter suggested that a regional ITS architecture with a twenty year time horizon is impractical and infeasible. One commenter suggested that either approach would require additional staff resources.

Response: The agency was concerned about the time horizon and development process needed to create a regional ITS architecture within the time period required and as a result suggested both an incremental and initial comprehensive approach. Based on the responses, the agency has modified the policy to be silent on the approach used to develop the regional ITS architecture. Instead, the agency focused on the products included in the regional ITS architecture, the effective date of the requirements, and the catalyst for requiring the development of a regional ITS architecture.

7. Do reviewers understand the relationships between the Integration Strategy, the Regional ITS Architecture, and the ITS Project Architecture?

Comment: Seven commenters provided a response to this question. In general, commenters did not understand the relationship between the Integration Strategy, regional ITS architecture, and the ITS Project Architecture. One commenter suggested that flexibility in application of project architecture must be maintained to accommodate legacy systems and to take advantage of technological innovation, while maintaining the outcome of interoperability, where applicable.

Response: The Agency is concerned with linkage between the planning process and the project development process. However, this policy only deals with the project level requirements.

Planning level requirements, including the Integration Strategy, will be explained as the Metropolitan and Statewide Planning Process rulemaking process is advanced. This policy only requires that the regional ITS architecture should be consistent with the transportation planning process. A definition for a project level ITS architecture has been added to the policy.

8. What additional guidance, if any, is required regarding phasing of this rule?

Comments: Six commenters submitted responses to this question. In general, the commenters stated that the phasing was clear. However, one commenter requested a three-year phase-in period. Several commenters requested that existing projects be exempt from the policy.

Response: The agency has clarified the policy statements that refer to the project status and the applicability of this policy. Projects that have reached final design by the date of this policy are exempt from the policy requirements. The agency has extended the time period for regional ITS architecture development to four years. Any region that is currently implementing ITS projects shall have a regional architecture within four years of the effective date of the final policy. All other regions not currently implementing ITS projects shall have a regional ITS architecture in place within four years of the first ITS project for that region advancing to final design.

9. Are the oversight and documentation requirements clear? If not, what is not clear about the requirements?

Comments: Eight commenters submitted responses to this question. Commenters in general requested more guidance from FTA on oversight and documentation requirements, but few provided suggestions to clarify the requirements. One commenter suggested that checklists to verify consistency requirements will be needed. Other commenters suggested that self-certification should be allowed, but also needs to be clearly defined.

Response: The agency will continue to use normal existing oversight procedures to review grantee compliance with FTA policies and regulations. Normal oversight procedures include the annual risk assessment of grantees performed by regional office staff, triennial reviews, planning process reviews, and project management oversight reviews, as applicable. In TEA–21, FTA was granted authority to use oversight funds to provide technical assistance to grantees in which oversight activities suggested non-compliance with agency policies and regulations. FTA is using oversight funds to specifically hire contractors with ITS experience who will monitor and assist grantees who are at risk of NOT meeting the National ITS Architecture Policy requirements. Additional guidance on oversight and documentation requirements will be provided.

Additional Comments

One commenter suggested that the proposed guidance circular requires that all of the agencies in a region agree before a project can be implemented, thus conferring ''veto'' power over the project. The agency does not intend for the policy to halt ITS deployment in areas where agencies cannot agree on project designs. As part of the regional ITS Architecture development, the agencies can agree to disagree, however, the regional ITS architecture should include a representation of the stand-alone ITS deployments.

One commenter suggests that the proposal infers that existing agreements between agencies will now need to be amended or redone, which would result in a halt in operations of successful ITS projects and prevent the completion of other ITS projects. In response to the comment, the agency has clarified the regional ITS architecture requirements to specify that existing agreements that address the regional ITS architecture requirements are sufficient and that new agreements are not necessarily required.

One commenter noted that a definition of ITS was not included in the policy. The commenter suggested that the definition provided in TEA–21 section 5206(e) should be included in the policy. The agency agrees and has added the definition of ITS to the list of definitions. However, the legislative definition of ITS is broad and other commenters have suggested that if the policy is written to include every new piece of electronics or hardware, then the policy would be too limiting. As a result, the policy is intended to apply only to projects meeting the definition of an ''ITS project'' listed in the ''Definitions'' section of the policy.

One commenter suggested that DOT should ensure that the Federal Highway Administration's (FHWA's) regulation and the FTA policy have the same statutory standing and that their requirements in ITS planning and deployment be consistent if not identical. The FTA and FHWA have different processes and procedures for project development. Therefore, the FHWA has issued a regulation, and FTA has issued the policy. The policy language in each document is consistent and will be carried out in a coordinated fashion, as applicable under FTA and FHWA project management and oversight procedures. FTA and FHWA planning procedures are a joint regulation and as such will be identical.

FTA received some comments regarding the use of standards. Several comments concern the premature use of required standards and interoperability tests, their impact on legacy systems, and confusion regarding the term ''adopted by the USDOT.''

In response to the comments, FTA has significantly modified the final policy to eliminate reference to the use of standards and interoperability tests prior to adoption through formal rulemaking. It is not the intent of the USDOT to formally adopt any standard before the standard is mature; also, not all ITS standards should, or will, be formally adopted by the USDOT. The only interoperability tests that are currently contemplated by the USDOT are those associated with the Commercial Vehicle Operations (CVO) program. These tests are currently being used by States deploying CVO systems and will follow a similar set of criteria for adoption as those defined for standards.

Other Changes

Several commenters expressed concern about linkages to the planning rule and the integration strategy. Comments regarding the portions of the National ITS Architecture conformity process included in the proposed transportation planning rule will be addressed as that rule proceeds to its issuance. The FHWA rule and the parallel FTA policy have been developed without direct reference to the proposed changes to the transportation planning process, including no mention of the development of an integration strategy. However, the policy statement of this guidance notes a link to transportation planning processes, and fully supports those collaborative methods for establishing transportation goals and objectives.

Policy Contents

I. Purpose
II. Definitions
III. Policy
IV. Applicability
V. Regional ITS Architecture
VI. Project Implementation
VII. Project Oversight
VIII. FTA Guidance

I. Purpose

This policy provides procedures for implementing section 5206(e) of the Transportation Equity Act for the 21st

Century, Public Law 105–178, 112 Stat. 547, pertaining to conformance with the National Intelligent Transportation Systems Architecture and Standards.

II. Definitions

Intelligent Transportation Systems (ITS) means electronics, communications or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system.

ITS project means any project that in whole or in part funds the acquisition of technologies or systems of technologies that provide or significantly contribute to the provision of one or more ITS user services as defined in the National ITS Architecture.

Major ITS project means any ITS project that implements part of a regional ITS initiative that is multi-jurisdictional, multi-modal, or otherwise affects regional integration of ITS systems.

National ITS Architecture (also ''national architecture'') means a common framework for ITS interoperability. The National ITS Architecture comprises the logical architecture and physical architecture which satisfy a defined set of user services. The National ITS Architecture is maintained by U.S. DOT (Department of Transportation) and is available on the DOT web site at *http://www.its.dot.gov.*

Project level ITS architecture is a framework that identifies the institutional agreement and technical integration necessary to interface a major ITS project with other ITS projects and systems.

Region is the geographical area that identifies the boundaries of the regional ITS architecture and is defined by and based on the needs of the participating agencies and other stakeholders. A region can be specified at a metropolitan, Statewide, multi-State, or corridor level. In metropolitan areas, a region should be no less than the boundaries of the metropolitan planning area.

Regional ITS architecture means a regional framework for ensuring institutional agreement and technical integration for the implementation of ITS projects or groups of projects.

Systems engineering is a structured process for arriving at a final design of a system. The final design is selected from a number of alternatives that would accomplish the same objectives and considers the total life-cycle of the project including not only the technical merits of potential solutions but also the costs and relative value of alternatives.

III. Policy

ITS projects shall conform to the National ITS Architecture and standards in accordance with the requirements contained in this part. Conformance with the National ITS Architecture is interpreted to mean the use of the National ITS Architecture to develop a regional ITS architecture in support of integration and the subsequent adherence of all ITS projects to that regional ITS architecture. Development of the regional ITS architecture should be consistent with the transportation planning process for Statewide and Metropolitan Transportation Planning (49 CFR part 613 and 621).

IV. Applicability

(a) All ITS projects that are funded in whole or in part with the Highway Trust Fund (including the mass transit account) are subject to these provisions.

(b) The Secretary may authorize exceptions for:

1. Projects designed to achieve specific research objectives outlined in the National ITS Program Plan under section 5205 of the Transportation Equity Act for the 21st Century or the Surface Transportation Research and Development Strategic Plan developed under section 5208 of Title 23, United States Code; or

2. The upgrade or expansion of an ITS system in existence on the date of enactment of the Transportation Equity Act for the 21st Century if the Secretary determines that the upgrade or expansion—

a. Would not adversely affect the goals or purposes of Subtitle C (Intelligent Transportation Systems) of the Transportation Equity Act for the 21st Century and

b. Is carried out before the end of the useful life of such system; and

c. Is cost-effective as compared to alternatives that would meet the conformity requirement of this rule

(c) These provisions do not apply to funds used for Operations and Maintenance of an ITS system in existence on June 9, 1998.

V. Regional ITS Architecture

(a) A regional ITS architecture shall be developed to guide the development of ITS projects and programs and be consistent with ITS strategies and projects contained in applicable transportation plans. The National ITS Architecture shall be used as a resource in the development of the regional ITS architecture. The regional ITS architecture shall be on a scale commensurate with the scope of ITS investment in the region. Provision should be made to include participation from the following agencies, as appropriate, in the development of the regional ITS architecture: Highway agencies; public safety agencies (*e.g.,* police, fire, emergency/medical); transit agencies; federal lands agencies; state motor carrier agencies; and other operating agencies necessary to fully address regional ITS integration.

(b) Any region that is currently implementing ITS projects shall have a regional ITS architecture February 7, 2005.

(c) All other regions not currently implementing ITS projects shall have a regional ITS architecture within four years of the first ITS project for that region advancing to final design.

(d) The regional ITS architecture shall include, at a minimum, the following:

(1) A description of the region;

(2) Identification of participating agencies and other stakeholders;

(3) An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the systems included in the regional ITS architecture;

(4) Any agreements (existing or new) required for operations, including at a minimum those affecting integration of ITS projects; interoperability of different ITS technologies, utilization of ITS-related standards, and the operation of the projects identified in the regional ITS architecture;

(5) System functional requirements;

(6) Interface requirements and information exchanges with planned and existing systems and subsystems (for example, subsystems and architecture flows as defined in the National ITS Architecture);

(7) Identification of ITS standards supporting regional and national interoperability;

(8) The sequence of projects required for implementation of the regional ITS architecture.

(e) Existing regional ITS architectures that meet all of the requirements of section V(d) shall be considered to satisfy the requirements of V(a).

(f) The agencies and other stakeholders participating in the development of the regional ITS architecture shall develop and implement procedures and responsibilities for maintaining the regional ITS architecture, as needs evolve within the region.

VI. Project Implementation

(a) All ITS projects funded with mass transit funds from the highway trust

fund shall be based on a systems engineering analysis.

(b) The analysis should be on a scale commensurate with the project scope.

(c) The systems engineering analysis shall include, at a minimum:

(1) Identification of portions of the regional ITS architecture being implemented (or if a regional ITS architecture does not exist, the applicable portions of the National ITS Architecture).

(2) Identification of participating agencies' roles and responsibilities;

(3) Requirements definitions:

(4) Analysis of alternative system configurations and technology options to meet requirements;

(5) Analysis of financing and procurement options;

(6) Identification of applicable ITS standards and testing procedures; and

(7) Procedures and resources necessary for operations and management of the system;

(d) Upon completion of the regional ITS architecture required in section V, the final design of all ITS projects funded with highway trust funds shall accommodate the interface requirements and information exchanges as specified in the regional ITS architecture. If the final design of the ITS project is inconsistent with the regional ITS architecture, then the regional ITS architecture shall be updated as per the process defined in V(f) to reflect the changes.

(e) Prior to completion of the regional ITS architecture, any major ITS project funded with highway trust funds that advances to final design shall have a project level ITS architecture that is coordinated with the development of the regional ITS architecture. The final design of the major ITS project shall accommodate the interface requirements and information exchanges as specified in this project level ITS architecture. If the project final design is inconsistent with the project level architecture, then the project level ITS architecture shall be updated to reflect the changes. The project level ITS architecture is based on results of the systems engineering analysis, and includes the following:

(1) A description of the scope of the ITS project

(2) An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the ITS project;

(3) Functional requirements of the ITS project;

(4) Interface requirements and information exchanges between the ITS project and other planned and existing systems and subsystems; and

(5) Identification of applicable ITS standards

(b) All ITS projects funded with Mass Transit Funds from the Highway Trust Funds shall use applicable ITS standards and interoperability tests that have been officially adopted through rulemaking by the United States Department of Transportation (US DOT).

(c) Any ITS project that has advanced to final design by (effective date of policy) is exempt from the requirements of VI.

VII. Project Oversight

(a) Prior to authorization of Mass Transit Funds from the Highway Trust Fund for acquisition or implementation of ITS projects, grantees shall self-certify compliance with sections V and VI. Compliance with this policy shall be monitored under normal FTA oversight procedures, to include annual risk assessments, triennial reviews, and program management oversight reviews as applicable.

(b) Compliance with the following FTA Circulars shall also be certified:

- C5010.1C, Grant Management Guidelines
- C6100.1B, Application Instructions and Program Management Guidelines

VIII. FTA Guidance

FTA will develop appropriate guidance materials regarding the National ITS Architecture Consistency Policy.

Issued on: January 2, 2001.

Nuria I. Fernandez,

Acting Administrator.

[FR Doc. 01–392 Filed 1–5–01; 8:45 am]

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APPENDIX C

MINUTES FROM STAKEHOLDER MEETINGS

Incident Management
March 23, 2004, 10:00 AM, CRCOG Offices, 241 Main Street, Hartford

This meeting involved members of the Greater Hartford Incident Management Steering Committee (IMSC). The participants included:

- Karen Olson, CRCOG
- Matthew Reimondo, East Hampton Police Chief
- Tim Vibert, Towing and Recovery Professionals of CT
- Roman Pryputniewicz, Towing and Recovery Professionals of CT
- Matthew Williamson, Dept of Environmental Protection
- Michael Eremita, East Hartford Fire Chief
- Robert Haramut, Midstate RPA
- Margus Lann, CCRPA
- Robert Kennedy, ConnDOT
- Robert Ramierz, FHWA
- Ammar Kanaan, IBI Group
- Carl-Henry Piel, IBI Group
- Patrick Chan, ConSysTec

The meeting began with introductions. Mr. Kanaan then provided a presentation on the background and goals of the project.

Mr. Eremita indicated that their most prevalent problem with incident response was identifying the exact location of the incident, including in which direction of a limited access roadway the incident occurred. As an example, although the incident (on the limited access roadway) may occur in Town A, the nearest entrance to reach the location may be in Town B, or if the incident is in the other direction of traffic, the nearest entrance may be in Town C. Depending on the exact location, it may be better for Town B's or Town C's fire department to respond. Thus, confirmation on the location of the incident, perhaps by video images, is very helpful.

The next prevalent problem is confirmation of the type of incident and types of vehicles involved. For example, the term "truck" has a different meaning to different responders. Correct identification of the type of incident and vehicles results in the dispatch of the proper vehicles and equipment by the fire department (fully-equipped rig) and towing company (regular tow-truck or heavy tow-truck), and the proper dispatch of the appropriate agencies, as necessary (CT DEP for hazmat). This results in faster removal of the incident and minimizes wasted resources (such as dispatch of the wrong vehicle).

A related issue is better coordination between the responders. Scenarios were discussed where the fire department closed two lanes to traffic for safety purposes but was told to clear the lanes, although a clean-up crew was on stand-by at an incident location for 3 hours. It wasn't until 3 hours later they were allowed to close one lane for clean-up because no one spoke with CT DEP or the fire department.

Other points:

- There was some desire for a centralized regional dispatch center.

- Usually, town police, fire and EMS dispatchers sit side-by-side. Most towns have computer-aided dispatch systems (CAD), although most do not have AVL because of costs. There are no county agencies (emergency or maintenance).

- Automated Vehicle Location is not a union issue for the region. Most tow trucks have GPS systems on them, and Northeast CT EMS is also putting in GPS. ConnDOT indicated it is interested in getting the AVL information for probe surveillance.

- Tow wreckers have limited communications capability with the Connecticut State Police (CSP). Usually, CSP dispatches the tow wreckers. Tow wreckers have no current communications capability with ConnDOT.

- ConnDOT generally receives its incident information from CSP and forwards its incident information to CSP.

- There is a current effort by US DHS (announced 1 March 2004) to create a National Incident Information Management System (NIMS) (http://www.dhs.gov/interweb/assetlibrary/NIMS-90-web.pdf). Connecticut will probably adopt the system once it is online.

- Amber Alerts are issued by CSP. All local PDs have to request CSP to issue it.

- Most towns have preempion for fire departments. Preempion for EMS vehicles varies by town. ConnDOT offers preempion for all municipal fire departments on its traffic signals, although usually the towns have to pay for maintenance.

- Cellular 911 calls are usually routed to CSP.

- There is a statewide emergency operations center, which is spun up by the Governor. Each municipality also has an EOC.

- Hazmat cleanups are handled by DEP.

- Towing dispatch is by rotation.

- Currently, only PD vehicles have MDTs, and via CAPTAIN have vehicle to vehicle communications, but not to the dispatch center.

Door-to-Door Transit
March 23, 2004; 1:30 PM, GHTD Training Room, 1 Union Place, Hartford

This meeting included some of the door-to-door transit providers in the Greater Hartford region. The participants included:

- Arthur L. Handman, Greater Hartford Transit District
- Dennis Lyons, DATTCO
- Jon Colman, Rideshare
- Karen Olson, CRCOG
- Robert Kennedy, ConnDOT
- Robert Ramierz, FHWA
- Ammar Kanaan, IBI Group
- Carl-Henry Piel, IBI Group
- Patrick Chan, ConSysTec

The meeting began with introductions. Mr. Kanaan then described the background and goals of the project.

GHTD's transit services are mostly under contract with CT Transit. They have approximately 60 transit vehicles, which are computer dispatched. GHTD only provides paratransit service. Eligibility requirements are determined at the central dispatch and provided to drivers. Payment is by cash transaction with the driver, or electronic payment with service agencies.

GHTD would like to install AVL systems and transit maintenance scheduling sensors and systems on their transit vehicles. GHTD is also interested in obtaining real-time traffic information and roadway weather information from ConnDOT. Currently, bus drivers report roadway conditions to the dispatch center, but that information is not shared with other centers.

GHTD is open to a regional smart card. SWRPA did a study several years ago with a recommendation to implement a smart card. However the transit providers are very interconnected with New York City, and any regional smart card should be compatible with a New York City regional smart card.

DATTCO provides fixed, paratransit, and school transit services. DATTCO is currently testing cameras and panic buttons on some of their buses. Requests for emergency response would then be sent to the local police via the transit dispatch center. DATTCO also has AVL on its commuter buses (ATROAD), which are sending location information every 15 minutes. AVL information can be polled more frequently, although that would mean an increase in communications costs. ConnDOT indicated its interest in receiving their AVL for probe surveillance.

DATTCO also provides paratransit service for human service agencies directly, then bills the agency directly.

The Rideshare Company has 360 vans, providing service along pre-determined routes, with slight diversions as necessary. "Emergency" rides can be provided via computer-aided dispatch. Drivers are volunteers, and route services are by vanpools. The service area includes all of Connecticut, and parts of Rhode Island, and Eastern New York. Rideshare has a call center, which also provides fixed route and commuter bus information for other transit systems.

Payment is generally pre-paid, via check, credit card or employers. It has no subsidies, and is not a paratransit service; it's more of a demand-responsive service. Rideshare has a proprietary tracking system, although it does not have an AVL system ($0.5 million to equip). Rideshare would like to have MDTs in its vans so it can re-route for a demand.

ConnDOT would like to have a customer information center for public transportation, along with a universal website. The website would provide ride-share matching, and include connections with TRIPS123 (or be similar to). The current thought is CTRIDES.COM, working with TRIPS123. This would be a basis for providing transit information to ConnDOT's planned 511 system.

Each transit provider maintains a ridership database, but only Section 15 reporting is provided to ConnDOT. The Section 15 reporting is currently manual.

Other points:

- They will meet with TRIPS123 later this week to discuss an interface.
- ConnDOT has an AVL demonstration project in Bridgeport, involving approximately 30 bus routes. ConnDOT is also working on a statewide interoperability specification for AVL systems in the state. With interoperability, different transit systems will have the capability to coordinate feeder schedules with fixed-route schedules. Expect 2 years for implementation.
- The transit providers indicated that a common GIS database would be helpful.
- School districts either contract their school bus service or have their own service.

Traffic Management - Municipalities
March 25, 2004, 1:30 PM, ConnDOT Highway Operations Center, 2800 Berlin Turnpike, Newington

This meeting involved representatives from the traffic divisions of several municipalities in the Greater Hartford area. The participants included:

- Denise Horan, Town of East Hartford
- Jim Mayer, Town of Manchester
- Mark Carlino, Town of Manchester
- Kevin Burnham, Hartford DPW
- Duane Martin, Town of Windsor
- Tom Lenehan, Town of Windsor
- Rob Haramut, Midstate RPA
- Jennifer Carrier, CRCOG
- Ken Shooshan-Stoller, CCRPA
- Karen Olson, CRCOG
- Bob Kennedy, DOT – Highway Operations
- Robert Ramirez, Federal Highway Administration
- Angus Davol, IBI Group
- Patrick Chan, ConSysTec

The meeting began with introductions. Mr. Davol then provided a presentation on the background and goals of the project.

The City of Hartford has an Econolite distributed traffic signal system with 215 signals, and Type 170 controllers. Because of the recent migration from the UTCS system, the new system currently does not support special event plans. There is currently no preempion (other than local preempion next to the firehouses) and no plans to install a system. There is also currently little traffic coordination with ConnDOT, but it may not be necessary. The Fire Department currently performs signal repair, and has access to the traffic signal system, although FD is not proactive in monitoring the signals (waits until a call comes in).

The City of Hartford does have some vehicle detection, although maintenance is an issue. The City also has a CCTV system, which it shares with ConnDOT, with some shared control. The City of Hartford only collects traffic counts from its vehicle sensors on an as-needed basis. The City also has some railroad crossings, and lane control signals for reversible lanes, although the lane control signals are only field-controlled on a time-of-day basis. There are plans to remove some of the lane control signals.

The City of Hartford would like roadway weather sensors and would like to share more real-time information with ConnDOT. It has preliminary plans to put road network information on the City web site, including camera scenes, some real-time information, and construction information. It would also like AVL on its maintenance vehicles, particularly for snow operations.

The City of Manchester has a closed loop system currently being installed with 19 traffic signals. It also has video cameras used for traffic detection. It provides signal preempion for its local fire trucks and for its snow plows. Maintenance operations currently looks at national weather services for weather information. The City also has a railroad crossing. The City would like to get a roadway weather information system, or perhaps get RWIS information from ConnDOT.

Transit signal priority is also being considered in the City. There are several busway initiatives being planned in the region.

The Town of East Hartford has 12 local traffic signals, with other traffic signals in the Town operated by ConnDOT. The traffic signals are mostly semi-actuated. Traffic signals are maintained by the local fire department, with a vendor on call. The fire department will contact ConnDOT if a ConnDOT signal needs to be repaired. All fire department vehicles have the Opticom system, and there are railroad crossings in the Town.

Their public works department does currently get weather reports. Road maintenance is the Town's biggest issue right now.

The Town of Windsor has 19 traffic signals, mostly fully actuated. Needs to add emergency vehicle preemption.

There is little coordination between state and town signals. ConnDOT currently operates a number of closed loop systems. It has installed Opticom on several of its signals for municipalities, controlled by FD, equipment paid by ConnDOT, and maintained by the Towns.

ConnDOT collects roadway weather information at several locations across the State, and the information is provided to its maintenance department. The RWIS information is on the intranet, and there are plans to put the information on the Internet.

ConnDOT also maintains traffic detectors on state roads, but traffic counts are collected only on demand. Traffic count information is archived but not normally used. ConnDOT has a planning effort every 3 years on state routes.

ConnDOT would like to share traffic signal information with municipalities, including special event information and construction information. Construction information is currently on its website. State Traffic Commission handles special events for the State.

ConnDOT has does not really have ramp metering and no lane use signals.

ConnDOT would like to share diversion routes electronically. These are currently on paper. ConnDOT, working with local PDs, maintains the current diversion routes. Diversion information may include signage information.

The regional planning organizations do congestion management studies; ConnDOT provides historical data on a per-lane basis. However, all other information, such as turning movement counts, is collected internally, on request.

ConnDOT does collect statewide crash from PDs and CSP on a mainframe, but only for state roads. Property damage information is not collected by State anymore, except ConnDOT. There is a traffic records committee trying to combine all roadway features, counts, and crash data into a single file, but its status is unknown. The Statewide crash forms are completed by PDs and sent to CSP. Office of Planning, ConnDOT collects the information. A lot of the input from PD is via MDTs. There is a separate file for commercial traffic. The Town of Manchester traffic department can get its town crash information from its PD.

Rentschler field has its own traffic operations center. ConnDOT shares traffic images to the field, and the field TOC informs ConnDOT of incidents and when the event is let out.

Fixed Route Transit
March 30, 2004, 10:00 AM, ConnDOT Highway Operations Center, 2800 Berlin Turnpike, Newington

This meeting involved representatives from the managing companies of different fixed-route transit companies in the Greater Hartford area. The participants included:

- Stephen Warren, CT Transit
- Maureen Strong, Middletown Transit
- Thomas Cheeseman, Middletown Transit
- Peter A. Agostini, New Britain Transportation
- Walter Vesciko, City of Bristol
- Robert Haramut, Midstate RPA
- Ken Shooshan-Stoller, CCRPA
- Karen Olson, CRCOG
- Bob Kennedy, DOT – Highway Operations
- Angus Davol, IBI Group
- Patrick Chan, ConSysTec

The meeting began with introductions. Mr. Davol then provided a presentation on the background and goals of the project.

CT Transit

CT Transit uses an electronic fare payment card with magnetic stripe. The information is downloaded at night from the buses and includes ridership data. Fare cards are sold by employers, by mail, or on the bus.

CT Transit has DVRs (digital video recorders) on 70% of their buses. Video is stored locally on the bus only, so video is not reviewed unless an incident occurs. They usually store the video for 4 days. CT Transit also has CCTV cameras at their facilities and parking lots, and the video is recorded, although not actively looked at. They store those videos for 30 days. At their facilities, they have magnetic cards for access, and are planning to move to proximity cards. Their vehicles have vehicle transponders for opening facility gates. Buses have a silent alarm/panic button.

They also maintain an asset inventory of all their parts using barcodes. CT Transit has 3 divisions, Hartford, New Haven, and Stamford. Each division has its own transfer station. All parts inventory is from the Hartford maintenance facility. Each transit vehicle also has a second transponder for the fluids management system - as bus pulls into the service lane, mileage and fluids (oil, antifreeze, gas) are measured and uploaded into their maintenance system.

CT Transit currently maintains an Internet web site for customer information and monthly passes.

CT Transit has stops at parking lots (park-and-ride).

They have some interfaces with other transit systems, including Amtrak, but all coordination is via telephone. They do coordinate fares (same mag-stripe card) and schedules with other fixed-route bus systems, but would love to have more automated transit coordination. There is some coordination internally within CT Transit. They also would like to coordinate with paratransit operators. There are bus stops at the airports, but no coordination. For the New Haven and Stamford divisions, there is 2-way radio communications with Amtrak and Shoreline East RR.

CT Transit would like a smart card for fare payment. Would also like a new fare collection system that is more reliable. Would like to have an AVL and to put real-time schedules on the website.

Would like to get real-time traffic information and detour information from ConnDOT, CSP (CT State Police), police departments and other agencies. Another need is improved bus stop signage, which may include dms at key bus stops, such as transfer stations. Would also like some bus replacement, a new garage.

Uses Nextel for radio communications as a backup.

CT Transit downtown information booth in Hartford.

BRT

The proposed busway system will have AVL, automated off-vehicle fare collection and automated customer information. Transit priority and DMS at bus stops have been proposed. Completion of the busway is expected in mid-2007. As the specifications for the busway have not been contracted yet, the features are only proposed for now.

Responsibility for the maintenance and operation of the parking lots yet to be determined.

New Britain

Services Plainville, Kensington Newington, Bristol. Has a website with links to other transit agencies. Has GFI fareboxes. 15 units, 15 routes. Doesn't coordinate with DATTCO and 2 fixed routes and paratransit right now. Ridership data is collected manually. NBT is the management company for Waterbury. No transit security.

Would like DMS in commercial areas, at bus stops or transfer stations.

Middletown Transit District

Provides urban and rural fixed routes, and ADA paratransit. Services Middletown, Portland, Middlefield, and Meriden. Adding bus stop annunciators (voice) feature to announce next stop, although manually activated by bus driver via a button and not based on AVL. Has a federal grant to upgrade fareboxes. Accepts CT Transit mag-stripe card currently. Upgrading its video surveillance on buses. Middletown bus station has CCTV also.

Would like AVL, need a new garage. Would like better transit coordination with Meridian, Cromwell. The Middletown transit terminal includes other bus transit systems.

Provides emergency evacuation (medical) for certain cities/towns, activated by the region 6 fire chief.

No website currently.

Each bus has a black box for impact data and for accident investigation. Bus driver has a panic button that changes the message on the bus. Has pre-arranged codes (voice) between bus drivers and dispatch.

General

Funding for capital projects from FTA on an 80/20 split. For other project, in Middletown, State pays 60/70, Middletown 20, rest from farebox.

ConnDOT gets monthly information, such as reports, ridership, and comments (mostly by paper). Each transit company also directly enters data into National Transit Database on-line annually. Data includes mileage and ridership.

Weather information not as important for their big buses.

Bus systems currently communicate with ConnDOT by telephone. ConnDOT sends out construction notification by e-mail, on a daily basis.

Operations of the Park-and-Ride lots are usually contracted out, and ConnDOT maintains the lot.

CRCOG Emergency Planning Technical Committee
March 30, 2004, 2:00 PM, South Congregational Church, 277 Main Street, Hartford

We were invited to this regularly-scheduled meeting to find more information on the CAPTAIN system used by the regional police department. The participants included:

- Rudolf Rossmy, Vernon PD
- Don Weglarz, Vernon PD
- Rich Mulhall, Newington PD
- Karen Olson, CRCOG
- Angus Davol, IBI Group
- Patrick Chan, ConSysTec
- Bob Kennedy, ConnDOT
- Cheryl Assis, CRCOG
- Bill Hollman, Hartford PD
- Rick Tardif, Farmington PD
- David Bourque, Suffield PD
- Drew O'Connor, Rocky Hill PD

The meeting began with introductions. Mr. Kennedy then discussed the background and goals of the project.

The CAPTAIN system consists of mobile data terminals in police vehicles that allow police communities in the Capital Region to have direct contact with other police vehicles and send information to each other. The system was intended to be only the Capital Region, but includes most of the city/town PDs. CAPTAIN ties the police vehicles with each other and allows access to NCIC, other federal database systems, DMV, and the Department of Corrections database. Some units in CSP also have CAPTAIN, but CSP is developing their own system.

The CAPTAIN system is maintained by City of Hartford PD. Current capabilities include instant messaging and access to the database. Police officers can complete their reports in the vehicles using the MDTs, through the Records Management System (RMS). Future capabilities being developed include connections to each PD's CAD, and the ability to see which vehicles are on-duty and their current location (graphics and mapping unknown at this time).

The current design is that messages from the MDTs (using CDPD) go through the switch in Hartford, and then into each PD's RMS.

The new modems (haven't selected the technology yet, CDMA or GRPS) will have GPS built in.

FD would like something similar for sharing information, including accessing building plans, etc. One town has it.

CAPTAIN does have an API for interfacing the different CAD systems, but they think it's proprietary as opposed to an open standard.

Diversion plans were discussed. Suggestion to put it on a website so the most updated plan is always available to everyone. Will be helpful, e.g., how to re-route I-95 Bridgeport; sent out by ConnDOT several years ago.

Municipal EOCs are spun up when the CEO of the town/city declares an emergency and that CEO coordinates.

APPENDIX D

EQUIPMENT PACKAGE DESCRIPTIONS

Equipment Package Descriptions

Equipment Package	*Description*
Barrier System Management	This equipment package provides the management of barrier systems for transportation facilities and infrastructure. Barrier systems include automatic or remotely controlled gates, barriers and other systems intended to preclude an attack or control access during and after an incident. When access to part of the transportation system is impacted by the activation of a barrier system, travelers and appropriate subsystems are notified.
Basic Information Broadcast	This equipment package provides the capabilities to collect, process, store, bill, and disseminate traveler information including traveler, transit, ride matching, traffic, and parking information. The traveler information shall include maintaining a database of local area services available to travelers with up-to-the-minute information and providing an interactive connectivity between, sponsors, and providers of services. The transit information shall include the latest available information on transit routes and schedules, transit transfer options, transit fares, and real-time schedule adherence. The traffic information shall include latest available information on traffic and highway conditions, and current situation information in real-time including incidents, road construction, recommended routes, current speeds on specific routes, current parking conditions in key areas, schedules for any current or soon to start events, and current weather situations. This equipment package shall also provide users with real-time travel related information while they are traveling, and disseminate to assist the travelers in making decisions about transfers and modification of trips. These capabilities shall be provided using equipment such as a fixed facility with a communications system such as a data Subcarrier multiplexing device.
Center Secure Area Alarm Support	This equipment package receives traveler or transit vehicle operator alarm messages, provides acknowledgement of alarm receipt back to the originator of the alarm, and determines an appropriate response. The alarms received can be generated by silent or audible alarm systems and may originate from public areas (e.g. transit stops, park and ride lots, transit stations, rest areas) or transit vehicles. The nature of the emergency may be determined based on the information in the alarm message as well as other inputs.
Center Secure Area Sensor Management	This equipment package manages sensors that monitor secure areas in the transportation system, processes the collected data, performs threat analysis in which data is correlated with other sensor, surveillance, and advisory inputs, and then disseminates resultant threat information to emergency personnel and other agencies. The sensors may be in secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. The types of sensors include acoustic, threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity, motion and object sensors.
Center Secure Area Surveillance	This equipment package monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel. It automatically alerts emergency personnel of potential incidents.
Collect Traffic Surveillance	This equipment package collects, stores, and provides electronic access to the traffic surveillance data.
Emergency Call-Taking	This equipment package supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other equipment packages that formulate and manage the emergency response. This equipment package receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.

Equipment Package	*Description*
Emergency Dispatch	This equipment package supports safe and efficient dispatch of emergency vehicles. It tracks the location and status of emergency vehicles and dispatches these vehicles to incidents. Pertinent incident information is gathered from the public and other public safety agencies (see the Emergency Call-Taking equipment package) and relayed to the responding units. Incident status and the status of the responding units is tracked so that additional units can be dispatched and/or unit status can be returned to available when the incident is cleared and closed.
Emergency Early Warning System	This equipment package monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies and uses this information to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to other equipment packages that provide the emergency response, including public notification using ITS traveler information systems, where appropriate.
Emergency Evacuation Support	This equipment package coordinates evacuation plans among allied agencies and manages evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety. Where appropriate, the affected population is evacuated in shifts, using more than one evacuation route, and including several evacuation destinations to spread demand and thereby expedite the evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, or along the evacuation route are informed of the plan. The public is provided with real-time evacuation guidance including basic information to assist potential evacuees in determining whether evacuation is necessary. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times. The evacuation and reentry status are monitored
Emergency Response Management	This equipment package provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. This equipment package develops and stores emergency response plans and manages overall coordinated response to emergencies. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. This equipment package provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It provides vital communications linkages which provide real-time information to emergency response personnel in the field.
Field Secure Area Sensor Monitoring	This equipment package includes sensors that monitor conditions of secure areas including facilities (e.g. transit yards) and transportation infrastructure (e.g. bridges, tunnels, interchanges, and transit railways or guideways). Included are acoustic, environmental threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity and motion and object sensors.
Field Secure Area Surveillance	This equipment package includes video and audio surveillance equipment that monitors conditions of secure areas including facilities (e.g. transit yards) and transportation infrastructure (e.g. as bridges, tunnels, interchanges, and transit railways or guideways). This package provides the surveillance information to the Emergency Management Subsystem for possible threat detection. The equipment package also provides local processing of the video or audio information, providing processed or analyzed results to the Emergency Management Subsystem. This equipment package provides the same functions as the Traveler Secure Area Surveillance equipment package.
Fleet HAZMAT Management	This equipment package provides the Fleet and Freight Management Subsystem the capabilities to enhance the Fleet Administration equipment package functions by adding HAZMAT tracking. The additional requirements to perform this function include enhanced processing and enhanced fleet management software. In order to effectively track HAZMAT cargo, communication interfaces to Information Service Providers, and Emergency Management Subsystems shall be provided, including additional communication software.

Equipment Package	*Description*
HRI Traffic Management	This equipment package monitors highway-rail intersection (HRI) equipment at the roadside which manages highway traffic. Various levels of roadside equipment may be interfaced to, and supported by, this equipment package to include standard speed active warning systems and high speed systems which provide additional information on approaching trains and detect and report on obstructions in the HRI. This equipment package remotely monitors and reports the status of this roadside equipment. A two way interface supports explicitly status requests or remote control plan updates to be generated by this equipment package. Status may also be received periodically in the absence of a request or asynchronously in the event of a detected failure or other unsafe condition at the intersection.
Incident Command	The equipment package provides tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders to support local management of an incident. The equipment package supports communications with public safety, emergency management, transportation, and other allied response agency centers, tracks and maintains resource information, action plans, and the incident command organization itself. Information is shared with agency centers including 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.
Interactive Infrastructure Information	This equipment package shall have as prerequisite the capabilities of the Basic Information Broadcast equipment package. This equipment package augments the Basic Information Broadcast equipment package by providing the capabilities for interactive traveler information.
ITS Data Repository	This equipment package collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. This equipment package includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. This equipment package supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region.
Mayday Support	This equipment package receives Mayday messages and security alarms, determines an appropriate response, and either uses internal resources or contacts a local agency to provide that response. The nature of the emergency is determined based on the information in the mayday or alarm message as well as other inputs. This package effectively serves as an interface between automated mobile mayday systems and alarm systems and the local public safety answering point for messages which require a public safety response. This equipment package represents the general security services provided by telematics service providers as well as more specific services that focus on commercial vehicle safety and security.
MCM Automated Treatment System Control	This equipment package remotely monitors and manages automated road treatment systems, providing status to the operator.
MCM Environmental Information Collection	This equipment package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway. In addition to fixed sensor stations at the roadside, this equipment package also collects environmental information from sensor systems located on Maintenance and Construction Vehicles, and sensor data that is made available by other systems..
MCM Incident Management	This equipment package supports coordinated response to highway incidents. Incident notifications are shared, incident response resources are managed, and the overall incident situation and incident response is coordinated among allied response organizations.
MCM Maintenance Decision Support	This equipment package recommends maintenance courses of action based on current and forecast environmental and road conditions and additional application specific information. Decisions are supported through understandable presentation of filtered and fused environmental and road condition information for specific time horizons as well as specific maintenance recommendations that are generated by the system based on this integrated information. The recommended courses of action are supported by information on the anticipated consequences of action or inaction, when available.

Equipment Package	*Description*
MCM Roadway Maintenance and Construction	This equipment package provides overall management and support for routine maintenance on a roadway system or right-of-way. Services managed are 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, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling routine maintenance activities.
MCM Vehicle and Equipment Maintenance Management	This equipment package monitors vehicle and equipment condition, tracks maintenance history, and schedules routine and corrective maintenance.
MCM Winter Maintenance Management	This equipment package manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications) based on weather information.
MCM Work Activity Coordination	This equipment package disseminates work activity schedules to other agencies. Work schedules are coordinated, factoring in the needs and activities of other agencies and adjacent jurisdictions.
MCM Work Zone Management	This equipment package remotely monitors and supports work zone activities, 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.
MCV Roadway Maintenance and Construction	This equipment package includes the on-board systems that support routine non-winter maintenance on a roadway system or right-of-way. Routine maintenance includes 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, etc.).
MCV Vehicle Location Tracking	This equipment package tracks vehicle location and reports this location to a dispatch center.
MCV Vehicle Safety Monitoring	This equipment package detects vehicle intrusions in the vicinity of the vehicle and warns crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone. This equipment package can be used for stationary work zones or in mobile applications where a safe zone is maintained around the moving vehicle.
MCV Vehicle System Monitoring and Diagnostics	This equipment package includes on-board sensors capable of monitoring the condition of each of the vehicle systems and diagnostics that can be used to support vehicle maintenance.
MCV Winter Maintenance	This equipment package supports snow plow operations and other roadway treatments (e.g., salt spraying and other material applications).
MCV Work Zone Support	This equipment package provides communications and support for local management of a work zone.
On-board Cargo Monitoring	This equipment package provides the Commercial Vehicle Subsystem the capability to monitor both interstate and intrastate cargo safety and security such that enforcement and HAZMAT response teams can be provided with timely and accurate information. In addition, this package provides security alerts in the case of tampering or other cargo security breaches. This includes only the equipment on board the cargo container such as a communication device, possibly the addition of a cell-based radio, and equipment for the processing and storage of cargo material. This can also include optional sensors for temperature, pressure, load leveling, or acceleration depending upon the items monitored. It is already expected that the cargo location devices such as GPS equipment and an integration processor already exist. These items are presented as part of the On-board Trip Monitoring equipment package.
On-board EV En Route Support	This equipment package provides capabilities that support safe and expedient arrival to and departure from the incident scene. This package provides dispatch and routing information, tracks the vehicle, and preempt signals via short range communication directly with traffic control equipment at the roadside.
On-board EV Incident Management Communication	This equipment package provides a direct interface between the emergency vehicle and incident management personnel.

Equipment Package	*Description*
On-board Fixed Route Schedule Management	This equipment package provides both fixed and flexible route transit services with the capability to automate planning and scheduling, by collecting data for schedule generation. Capability shall also be provided to automatically determine optimum scenarios for schedule adjustment. This equipment package also supports the capability for two-way voice communication between the transit vehicle operator and a facility, two-way data communication between the transit vehicles and a facility, on-board safety sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired.
On-board Maintenance	This equipment package provides the capability to use transit vehicle mileage data to automatically generate preventative maintenance schedules for each specific bus by utilizing vehicle tracking data and storing with a trip computer. It also provides the capability for real-time condition monitoring on board the vehicle, and transmission of this information via two-way communication to the management center.
On-board Paratransit Operations	This equipment package forwards paratransit and flexible-route dispatch requests to the operator and forwards acknowledgements to the center. It coordinates with, and assists the operator in managing multi-stop runs associated with demand responsive, flexibly routed transit services.
On-board Transit Fare and Load Management	This equipment package provides the capability to collect data required to determine accurate ridership levels and implement variable and flexible fare structures. Support shall be provided for the traveler for use of a fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified, and allow for third party payment. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported. This equipment package also supports the capability for two-way voice communication between the transit vehicle operator and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired. These capabilities require integration with an existing On-board Trip Monitoring equipment package.
On-board Transit Security	This equipment package provides security and safety functions on-board the transit vehicle. This includes surveillance and sensors to monitor the on-board environment, silent alarms that can be activated by transit user or vehicle operator, operator authentication, and a remote vehicle disable function. The surveillance equipment includes video (e.g. CCTV cameras), audio systems and/or event recorder systems. The sensor equipment includes threat sensors (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors) and object detection sensors(e.g. metal detectors).
On-board Transit Signal Priority	This equipment package provides the capability for transit vehicles to request signal priority through short range communication directly with traffic control equipment at the roadside.
On-board Transit Trip Monitoring	This equipment package provides the capabilities to support fleet management with automatic vehicle location and automated mileage and fuel reporting and auditing. This package may also record other special events resulting from communication with roadside equipment. This includes only the equipment on board the vehicle to support this function including the vehicle location devices such as GPS equipment, communication interfaces, a processor to record trip length, and the sensors/actuators/interfaces necessary to record mileage and fuel usage.
Parking Electronic Payment	This equipment package supports electronic payment of parking fees.
Parking Management	This equipment package provides the capability to detect and classify properly equipped vehicles entering and exiting the parking facility, and to maintain database information with parking availability and pricing structure information. This capability shall be provided through the utilization of active/passive tag readers and database software containing parking pricing structure and current availability. Fixed point communications with clearinghouse operators (the Financial Institution terminator) enable processing of financial transactions.

Equipment Package	*Description*
Rail Operations Coordination	This equipment package provides strategic coordination between rail operations and traffic management centers. It receives train schedules, maintenance schedules, and any other forecast events which will result in highway-rail intersection (HRI) closures from Rail Operations. The provided information is used to develop forecast HRI closure times and durations which may be applied in advanced traffic control strategies or delivered as enhanced traveler information. This equipment package includes the processing and algorithms necessary to derive HRI closure times and the communications capabilities necessary to communicate with rail operations and interface to the traffic control and information distribution capabilities included in other Traffic Management Subsystem equipment packages.
Remote Transit Fare Management	This equipment package provides the capability for the traveler to use a common fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified. This may be implemented as a payment instrument reader at a kiosk. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported.
Remote Traveler Security	This equipment package provides the capability to report an emergency and summon assistance from secure areas such as transit stops, transit stations, modal transfer facilities, rest stops and picnic areas, park-and-ride areas, tourism and travel information areas, remote roadways and emergency pull off areas. This package includes interfaces that facilitate initiation of an alarm, which is communicated to the Emergency Management Subsystem. This package allows for an acknowledgement of the alarm as well as a broadcast message to advise or warn the traveler.
Roadway Automated Treatment	This equipment package automatically treats a roadway section based on environmental or atmospheric conditions. Treatments can be in the form of fog dispersion, anti-icing chemicals, etc
Roadway Basic Surveillance	This equipment package monitors traffic conditions using fixed equipment such as loop detectors and CCTV cameras.
Roadway Environmental Monitoring	This equipment package measures environmental conditions and communicates the collected information back to a center where it can be monitored and analyzed. A broad array of general weather and road surface information may be collected. Weather conditions that may be measured include temperature, wind, humidity, precipitation, and visibility. Surface and sub-surface sensors can measure road surface temperature, moisture, icing, salinity, and other measures.
Roadway Equipment Coordination	This equipment package coordinates field equipment that is distributed along the roadway by supporting direct communications between field equipment. This includes coordination between remote sensors and field devices (e.g., Dynamic Message Signs) and coordination between the field devices themselves (e.g., coordination between traffic controllers that are controlling adjacent intersections.).
Roadway Freeway Control	Ramp meters, CMS and other freeway control effects which will control traffic on freeways.
Roadway HOV Control	This equipment package provides the capability to detect the HOV lane usage using sensor equipment. For lanes that become HOV or High Occupancy Toll (HOT) lanes during certain time of the day, it provides display equipment to notify users of their status.
Roadway Infrastructure Monitoring	This equipment package monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts). It includes sensors that monitor the infrastructure and the communications necessary to report this data to a center or vehicle-based maintenance system.
Roadway Probe Beacons	This equipment package monitors traffic and road conditions by collecting information from passing vehicles that are equipped with a transponder or other short range communications device. The probe data collected by this equipment package may include link travel times, average speeds, road conditions, and any other data that can be measured and communicated by passing vehicles. This equipment package consists of roadside equipment that communicates with passing vehicles using dedicated short range communications, collects the information provided by the vehicles, and forwards this information back to the Traffic Management Subsystem.

Equipment Package	*Description*
Roadway Signal Controls	This equipment package provides the capabilities to control traffic signals at major intersections and on main highways for urban areas. This equipment package is generally constrained to a single jurisdiction.
Roadway Signal Priority	This equipment package shall provide the capability to receive vehicle signal priority requests and control traffic signals accordingly.
Roadway Traffic Information Dissemination	This equipment package provides the roadside elements of traffic information dissemination including DMS, HAR, and talking pedestrian signs.
Roadway Work Zone Safety	This equipment package detects vehicle intrusions in work zones and warns crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone.
Safeguard System Management	This equipment package provides the management of safeguard systems for transportation facilities and infrastructure. Safeguard systems include blast shielding, exhaust systems and other automatic or remotely controlled systems intended to mitigate the impact of an incident. When access to a transportation facility is impacted by the activation of a safeguard system, travelers and appropriate subsystems are notified.
Service Patrol Management	This equipment package supports dispatch and communication with roadway service patrol vehicles.
Standard Rail Crossing	This equipment package manages highway traffic at highway-rail intersections (HRIs) where operational requirements do not dictate advanced features (e.g., where rail operational speeds are less than 80 miles per hour). Either passive (e.g., the crossbuck sign) or active warning systems (e.g., flashing lights and gates) are supported depending on the specific requirements for each intersection. 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 through interfaces to the wayside interface equipment and the traffic management subsystem.
TMC Environmental Monitoring	This equipment package assimilates current and forecast road conditions and surface weather information using a combination of weather service provider information and an array of environmental sensors deployed on and about the roadway. The collected environmental information is monitored and presented to the operator. This information can be used to more effectively deploy road maintenance resources, issue general traveler advisories, and support location specific warnings to drivers. Other equipment packages process the collected information and provide decision support.
TMC Evacuation Support	This equipment package supports development, coordination, and execution of special traffic management strategies during evacuation and subsequent reentry of a population in the vicinity of a disaster or major emergency. A traffic management strategy is developed based on anticipated demand, the capacity of the road network including access to and from the evacuation routes, and existing and forecast conditions. The strategy supports efficient evacuation and also protects and optimizes movement of response vehicles and other resources that are responding to the emergency.
TMC Freeway Management	Control system for efficient freeway management including integration of surveillance information with freeway road geometry, vehicle control such as ramp metering, CMS, HAR. Interface to coordinated traffic subsystems for information dissemination to the public.
TMC HOV Lane Management	This equipment package provides the capability to manage HOV lanes by coordinating freeway ramp meters and connector signals with HOV lane usage signals, and giving preferential treatments to HOV lanes to encourage drivers to carpool.
TMC Incident Detection	This equipment package provides the capability to traffic managers to detect and verify incidents. This capability includes analyzing and reducing the collected data from traffic surveillance equipment, monitoring external alerting and advisory and incident reporting systems, collecting special event information, and monitoring for incidents and hazardous conditions through available sensor and surveillance systems.

Equipment Package	*Description*
TMC Incident Dispatch Coordination/Communication	This equipment package provides the capability for an incident response formulation function minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies.
TMC Multimodal Coordination	This equipment package provides traffic signal priority for transit vehicles. Two options are provided including a wide-area option based on center to center communications between the Traffic Management and Transit Management Subsystems and a localized option based on direct communications between the transit vehicle and the individual intersection.
TMC Probe Information Collection	This equipment package provides the capability to accept and process probe vehicle information. This capability shall be provided through the use of additional hardware and probe vehicle control and tracking software.
TMC Regional Traffic Control	This equipment package provides capabilities in addition to those provided by the TMC Basic Signal Control equipment package for analyzing, controlling, and optimizing area-wide traffic flow. These capabilities provide for wide area optimization integrating control of a network signal system with control of freeway, considering current demand as well as expected demand with a goal of providing the capability for real-time traffic adaptive control while balancing inter-jurisdictional control issues to achieve regional solutions. These capabilities are best provided using a Traffic Management Center (TMC) to monitor and manage freeway ramp meters and intersection traffic signals and software to process traffic information and implement traffic management measures (e.g., ramp metering, signalization, and traffic coordination between both local and regional jurisdiction). The TMC shall be able to communicate with other TMCs in order to receive and transmit traffic information on other jurisdictions within the region.
TMC Signal Control	This equipment package provides the capability for traffic managers to monitor and manage the traffic flow at signalized intersections. This capability includes analyzing and reducing the collected data from traffic surveillance equipment and developing and implementing control plans for signalized intersections. Control plans may be developed and implemented that coordinate signals at many intersections under the domain of a single traffic management subsystem. In advanced implementations, this package collects route planning information and integrates and uses this information in predicting future traffic conditions and optimizing the traffic control strategy for these conditions. These capabilities are achieved through real-time communication of logged routes from an Information Service Provider. The planned control strategies can be passed back to the Information Service Provider so that the intended strategies can be reflected in future route planning.
TMC Traffic Information Dissemination	This equipment package provides the capability to disseminate traffic and road conditions information to travelers. Information is provided to drivers using DMS, HAR, and in-vehicle signing equipment. Information is provided to other travelers by making current road network conditions information available to information service providers and the media.
TMC Work Zone Traffic Management	This equipment package supports coordination with maintenance systems so that work zones are established that have minimum traffic impact. Traffic control strategies are implemented to further mitigate traffic impacts associated with work zones that are established.
Traffic Data Collection	This equipment package collects and stores traffic information that is collected in the course of traffic operations performed by the Traffic Management Subsystem. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.
Traffic Maintenance	This equipment package provides monitoring and remote diagnostics of field equipment to detect field equipment failures, issues problem reports, and tracks the repair or replacement of the failed equipment.

Equipment Package	*Description*
Transit Center Fare and Load Management	This equipment package provides the capability to accept collected data required to determine accurate ridership levels and implement variable and flexible fare structures. Support shall be provided for the traveler for use of a fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified, and allow for third party payment. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported. This equipment package also supports the capability for two-way voice communication between the transit vehicle operator and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired. These equipment package builds on basic capabilities provided by the Transit Center Tracking and Dispatch equipment package.
Transit Center Fixed-Route Operations	This equipment package enhances the planning and scheduling associated with fixed and flexible route transit services. The package allows fixed-route and flexible-route transit services to develop, print and disseminate schedules and automatically updates customer service operator systems with the most current schedule information. Current vehicle schedule adherence and optimum scenarios for schedule adjustment shall also be provided.
Transit Center Information Services	This equipment package collects the latest available information for a transit service and makes it available to transit customers and to Information Service Providers for further distribution. Customers are provided information at transit stops and other public transportation areas before they embark and on-board the transit vehicle once they are enroute. Information provided can include the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events. In addition to general service information, tailored information (e.g, itineraries) are provided to individual transit users.
Transit Center Multi-Modal Coordination	This equipment package provides the transit management subsystem the capability to determine the need for transit priority on routes and at certain intersections and request transit vehicle priority at these locations. It also supports schedule coordination between transit properties and coordinates with other surface and air transportation modes. As part of schedule coordination, this equipment package shares transit transfer cluster (a collection of stops, stations, or terminals where transfers can be made conveniently) and transfer point information between Multimodal Transportation Service Providers, Transit Agencies, and ISPs.
Transit Center Paratransit Operations	This equipment package provides the capability to automate planning and scheduling, allowing paratransit and flexible-route transit services to develop, print and disseminate schedules, and automatically update customer service operator systems with the most current schedule. In addition, this equipment package provides the capability to assign vehicle operators to routes in a fair manner while minimizing labor and overtime services, including operator preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual operator. These capabilities shall be provided through the utilization of dispatch and fleet management software running on a workstation type processor.
Transit Center Security	This equipment package provides the capability to monitor transit vehicle operator or transit user activated alarms received from on-board a transit vehicle. This package also includes the capability to support transit vehicle operator authentication and the capability to remotely disable a transit vehicle. This package also includes the capability to alert operators and police to potential incidents identified by these security features.

Equipment Package	*Description*
Transit Center Tracking and Dispatch	This equipment package provides the capabilities for monitoring transit vehicle locations and determining vehicle schedule adherence. The equipment package shall also furnish users with real-time travel related information, continuously updated with real-time information from each transit system within the local area of jurisdiction, inclusive of all transportation modes, from all providers of transportation services, and provide users with the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents conditions, weather conditions, and special events. This equipment package also supports the capability for two-way voice communication between the transit vehicle operator and a facility, two-way data communication between the transit vehicles and a facility.
Transit Evacuation Support	This equipment package manages transit resources to support evacuation and subsequent reentry of a population in the vicinity of a disaster or other emergency. It supports coordination of regional evacuation plans, identifying the transit role in a regional evacuation and identifying transit resources that would be used. During an evacuation, this equipment package coordinates the use of transit and school bus fleets, supporting evacuation of those with special needs and the general population. Transit service and fare schedules are adjusted and updated service and fare information is made available through traveler information systems. This equipment package coordinates the functions in other Transit equipment packages to support these requirements.
Transit Garage Maintenance	This equipment package provides advanced maintenance functions for the transit property. It collects operational and maintenance data from transit vehicles, manages vehicle service histories, and monitors operators and vehicles. It collects vehicle mileage data and uses it to automatically generate preventative maintenance schedules for each vehicle by utilizing vehicle tracking data from a prerequisite vehicle tracking equipment package. In addition, it provides information to proper service personnel to support maintenance activities and records and verifies that maintenance work was performed. This equipment package receives special events and real-time incident data from the traffic management subsystem and assigns operators to vehicles and transit routes. Garage maintenance also receives information about incidents involving transit vehicles from the TMC in order to dispatch tow trucks and other repair vehicles.
Transit Garage Operations	This equipment package automates and supports the assignment of transit vehicles and operators to enhance the daily operation of a transit service. It provides the capability to assign operators to routes or service areas in a fair manner while minimizing labor and overtime services, considering operator preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual operator.
Traveler Secure Area Surveillance	This equipment package manages surveillance equipment that monitors secure areas in the transportation system that are frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, etc). This package collects the images and audio inputs at the secure area and provides the surveillance information to the Emergency Management Subsystem. The equipment package also provides local processing of the video or audio information, providing processed or analyzed results to the Emergency Management Subsystem. This equipment package provides the same functions as the Field Secure Area Surveillance equipment package.
Vehicle Mayday I/F	This equipment package shall provide the capability for an in-vehicle manually initiated distress signal with cancel a prior issued manual request for help feature. This capability shall include automatically identifying that a collision had occurred using equipment such as collision detection sensors with interface to mayday type equipment that would automatically detect vehicle problems and for some cases, automatically send appropriate distress signals to the Emergency Management Subsystem.
Vehicle Probe Support	This equipment package includes capabilities for the probe vehicle to identify its location, measure traffic conditions such as link travel time and speed and possibly environmental hazards such as icy road conditions, and transmit these data to either the ISP or TMC.
Vehicle Toll/Parking Interface	This equipment package shall provide the capability for vehicle operators to pay toll without stopping their vehicles and pay for parking without the use of cash. These capabilities shall be provided through the use of equipment such as an active tag interface and debit/credit card interface.