



---

STATEWIDE INTEGRATED ITS BUSINESS AND DEPLOYMENT PLAN

# Springfield/Branson Regional ITS Architecture

---

Prepared for:

The Missouri Department of Transportation

2211 St. Mary's Blvd.  
Jefferson City, MO 65109

---

April 30, 2004

Prepared by:

TransCore

920 W. 47<sup>th</sup> Street  
Kansas City, MO 64112

---

# ***Table of Content***

<b>1</b>	<b>REGIONAL DESCRIPTION.....</b>	<b>1-1</b>
1.1	The Regional Definition .....	1-1
<b>2</b>	<b>STAKEHOLDERS.....</b>	<b>2-1</b>
2.1	ITS Stakeholders .....	2-1
<b>3</b>	<b>OPERATIONAL CONCEPT.....</b>	<b>3-2</b>
3.1	Regional Stakeholder Roles .....	3-2
3.2	Regional Stakeholder Interactions – Market Package Approach.....	3-3
3.3	Market Packages Utilized in Regional Operations.....	3-4
3.4	Regional Market Packages Defined .....	3-5
<b>4</b>	<b>AGREEMENTS.....</b>	<b>4-1</b>
<b>5</b>	<b>SYSTEM FUNCTIONAL REQUIREMENTS .....</b>	<b>5-1</b>
5.1	System Functional Requirements – Equipment Package Approach .....	5-1
5.2	Regional Market Packages .....	5-1
5.3	Regional Functional Requirements.....	5-2
<b>6</b>	<b>INTERFACE REQUIREMENTS.....</b>	<b>6-1</b>
6.1	Sausage Diagram .....	6-1
6.2	Interconnect Flow Diagram.....	6-1
6.3	Architecture Flow Diagram.....	6-2
<b>7</b>	<b>STANDARDS.....</b>	<b>7-1</b>
7.1	Standard Development Organizations .....	7-1
7.2	NTCIP Standards .....	7-1
7.3	Applicable Standards for Springfield/Branson Regional ITS Architecture .....	7-2
<b>8</b>	<b>PROJECT SEQUENCING .....</b>	<b>8-1</b>

---

## ***Forward***

The Federal Highway Administration (FHWA) issued a final rule to implement Section 5206(e) of the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21) in January of 2001. Federal Rule 940 requires that Intelligent Transportation Systems (ITS) projects funded through the Highway Trust Fund conform to the National ITS Architecture and applicable standards. FHWA has further established a deadline of April 2005 for regions to have an ITS architecture in place.

To meet the requirement and ensure federal funding eligibility for ITS, the Missouri Department of Transportation (MoDOT) initiated the development of Regional Architectures for several regions in the State of Missouri. MoDOT has developed Regional ITS Architectures for three urban regions across the state; Springfield/Branson, St. Louis and Kansas City. The Regional ITS Architecture provides a framework for ITS systems, services, integration, and interoperability.

The following documents the Regional ITS Architecture for the Springfield/Branson region in Missouri. The information presented is designed to be modular. Thus future modifications or updates to the information can be done without the need to recompile the entire work. The modules are designed to correlate with the areas outlined by Federal Rule 940. As such each module is designed to address a specific regional architecture requirement established by the Rule.

Many of the modules are concise and require the user to be familiar with the National ITS Architecture 4.0. The Springfield/Branson Regional ITS Architecture was developed looking at a 5-year timeframe. ITS projects slated for design, development, and deployment over the coming 5 years were a focus of the following architecture work.

Architecture work is an ongoing process. ITS project priorities change, personnel and staff change, budgets change, and thus regional architecture work should be periodically “changed” to remain in sync with regional priorities and initiatives. To facilitate future modifications to the Springfield/Branson architecture the final Turbo Architecture Database and architecture report modules are submitted as part of this work. The CD containing the files can be found attached to the back of the report.

---

# 1 Regional Description

Springfield is the third largest city in the state of Missouri with an area over 75 square miles and serves nearly 300,000 area residents within a 75-mile radius as a regional employment, medical and retail center. After growing 15.8 percent in the 1980s, the metropolitan area grew an additional 23.2 percent during the 1990s. Also, it is estimated that the Springfield/Branson region hosts nearly seven million visitors each year.

The City of Springfield and the Missouri Department of Transportation (MoDOT) have partnered to address the increased demand for regional transportation improvements. In 1989, the City of Springfield and MoDOT entered into a contract to implement a multi-jurisdictional centralized closed-loop signal system that allowed signals from both agencies to operate as one system with coordination at locations where jurisdictions overlap. The City and MoDOT have continued to share resources and pursue additional partnerships to expand regional ITS programs.

## 1.1 The Regional Definition

The Springfield/Branson Regional definition includes a four county area from the northern boundary of Greene County to include the City of Springfield, Christian County, Stone County and Taney County to include the city of Branson. This area is part of MoDOT District 8, which consists of twelve counties in south central Missouri. Major routes and communities in this region are shown in the graphic to the right. I-44 is the only interstate that traverses this region, and U.S. Routes 60, 65, and 160 are other major transportation facilities in the region. As this region expands future programs will most likely include the Joplin area, which is west of Springfield along I-44 near the Missouri/ Oklahoma border. Expansion to the east could reach to Lebanon, Missouri approximately 38 miles from Springfield along I-44. It is also noted that the regional boundaries are tied to the communications backbone established in the region.



## 2 Stakeholders

To begin the formal process of documenting the regional architecture for the Springfield/Branson region a workshop was held on October 9, 2003 in Springfield. This workshop gathered information on the existing status of the architecture, the current ITS projects, and planned ITS projects for the area. This workshop focused on those projects that currently exist or are short-term funded programs. Stakeholders involved in the Springfield/Branson ITS Workshop held October 9<sup>th</sup> in included:

- The City of Springfield – Tom Dancey, Roger Lile
- Missouri Department of Transportation District 8 – Dale Ricks, Matt Seiler, Joe Rickman, Laurel McKean, Becky Baltz
- Missouri Department of Transportation Headquarters in Jefferson City – Lisa Vieth, Rick Bennett
- Missouri Department of Transportation Information Systems – Barbara Barnard

It was agreed that both MoDOT and the City of Springfield have taken lead roles in both the development of the ATMS system in Springfield but also the planning and development of ITS in the region. It was viewed that Laurel McKean, MoDOT and Tom Dancey, City of Springfield were co-champions for maintaining and monitoring the Springfield/Branson Regional ITS Architecture.

### 2.1 ITS Stakeholders

A number of stakeholders were identified early on in the ATMS development process. Several have had continued involvement and many other relationships continue to be formed. Stakeholders participating in the ITS planning, systems engineering process, and ATMS/ATIS development include:

- City of Springfield – Department of Public Works, Information Systems, and Public Information Office
- Missouri Department of Transportation – Traffic Division, Information Systems, and Public Affairs
- City of Branson – Engineering Department and Police
- Springfield-Greene County Emergency Communications (911)
- Springfield Police Department
- Greene County Sheriff's Department
- Missouri Highway Patrol
- Springfield Fire Department
- Cox Health Systems (EMS)
- St. John's Regional Health Systems (EMS)
- Springfield Office of Emergency Management
- Greene County Highway Department
- City Utilities of Springfield – Transit
- Burlington Northern/Santa Fe Railway
- Ozark Transportation Organization (MPO)
- Southwest Missouri State University - Transit
- Local Radio Stations
- Local Television Stations (KOLR (CBS/Fox), KSPR (ABC), KYTV (NBC))

- Springfield News-Leader (Press)
- TV23 (cable government access channel)

Thus far, the City and MoDOT traffic divisions have formed particularly strong partnerships with the Springfield Police Department and Springfield-Greene County Emergency Communications (911) as part of incident and special event management. As noted previously, partnerships have also recently been formed with local radio and TV media in providing traveler information through reports from the TMC and CCTV traffic video feeds.

### 3 Operational Concept

The Springfield/Branson region has many agencies with diverse operational roles and responsibilities for various transportation functions. Of those agencies most share basic information and in some situations resources to address regional transportation issues. A regional “operational concept” provides a definition to the roles each agency performs and begins the process of describing how the agencies interact.

The Springfield/Branson regional “Operational Concept” identifies the different stakeholder agency roles as they exist now and how they are envisioned over the coming 5-year timeframe. To establish a regional concept stakeholders are first defined by their primary regional functions. Thus each stakeholder’s roles are more easily identified. Using this information a basic organizational picture of how the region addresses transportation issues is developed. The combination of identifying the agency roles and interactions with other regional stakeholders completes the operational concept.

#### 3.1 Regional Stakeholder Roles

Stakeholders represent different backgrounds and perform a range of transportation related functions. They are made up of public and private entities, which typically operate out of a control, dispatch, or other center of operations. To identify and define the different stakeholders, [seven](#) categories (based on the National ITS Architecture) were adopted, which define the primary roles of the different regional agencies. The following briefly describes each category and list the associated regional stakeholders.

**Traffic Management:** Agencies that operate roadway equipment and serve to improve transportation system operation efficiency and safety. Traffic management agencies typically coordinate the other agencies by relaying pertinent traffic conditions and incidents and alerting the traveling public. Agencies that perform these functions for the Springfield/Branson region include:

- City of Springfield Department of Public Works
- City of Branson Engineering Department
- Missouri Department of Transportation – Traffic Division
- Springfield Traffic Management Center

**Emergency Management:** Agencies that operate in a public safety capacity, often coordinating efforts involving emergency response. Regional emergency management stakeholders include:

- Springfield-Greene County Emergency Communications (911)

- Springfield Police Department
- Greene County Sheriff's Department
- Missouri Highway Patrol
- Springfield Fire Department
- Springfield Office of Emergency Management

**Transit Management:** Agencies that manage, operate, and maintain transit vehicle fleets and or coordinate other transportation service modes. Regional transit management stakeholders would include:

- City Utilities of Springfield – Transit
- Southwest Missouri State University - Transit

**Maintenance and Construction Management:** Agencies that operate and manage maintenance vehicle fleets with responsibilities for emergency clean up, snow and ice removal, and annual upkeep of transportation facilities. Regional operations and maintenance stakeholders include:

- Greene County Highway Department
- City of Springfield Public Works Service Center
- Missouri Department of Transportation – Maintenance Department

**Media Outlet:** Agencies that provide traffic reports, travel conditions, and other transportation-related news services to the traveling public through radio, TV, and other media. Regional media stakeholders include:

- Local Radio Stations
- Local Television Stations
- Springfield News-Leader
- TV23 (Government access channel)
- Mediacom
- Ozarkstraffic.info

**Care Facility:** Agencies that provide emergency care capabilities (i.e. hospitals, trauma centers, clinics, ambulance service, EMS etc.) offering specialized expertise when dealing with critical and routine events. Regional care facility stakeholders would include:

- Cox Health Systems
- St. John's Regional Health Systems

**Rail Operations:** Agencies that have responsibility for coordinating rail traffic management and maintenance operations. This can include light and heavy rail services. Regional rail operators include:

- Burlington Northern/Santa Fe Railway

Identification of each stakeholder function in the region further facilitates understanding and translation of agency needs into the regional architecture.

### **3.2 Regional Stakeholder Interactions – Market Package Approach**

After categorizing the agencies by their responsibilities stakeholder interactions both existing and future are identified and documented. Using the National ITS Architecture and the corresponding Market Packages as a foundation provides a simple yet effective

method for describing how regional agencies are/will operate together. Market packages are a collection of systems involving center(s), roadway, vehicle, or traveler elements that work in combination to describe a transportation function or need. An example of this might include a dispatch center and a vehicle and the need to track a vehicles location. By themselves the center and vehicle are only elements but because market packages also detail information exchanges between these elements a better understanding of how these elements interact to address the need or function (track vehicle's location) is possible.

Through discussions with local stakeholders fourteen individual market packages were identified for the Springfield/Branson region. Those fourteen packages are grouped into **five** market package categories. Not all agencies participate in each market package.

To present the regional operational concept the identified market packages are presented here along with associated agencies that participate and typical system element interactions. Market packages are presented broken into **five** categories, which include advance traffic management, maintenance and construction management, advance public transportation, emergency management, and advance traveler information systems.

### **3.3 Market Packages Utilized in Regional Operations**

The following provide a description and listing of the market packages that are utilized for regional operations under the Springfield/Branson ITS Architecture. Not all market packages identified under the National ITS Architecture are applicable to the region. Out of a potential 75 different packages only 15 are pertinent to the region. Each of these is categorized and listed below as a quick reference.

#### **Advanced Traffic Management Systems**

Advanced Traffic Management System (ATMS) market packages focus on roadway operations. Typically involved agencies include a traffic operations center that monitors roadway conditions and identifies breakdowns in traffic flow caused by planned or unplanned incidents and initiates responses necessary to moderate the impact to the traveling public. Of the market packages identified under the National ITS Architecture of seven are applicable to the Springfield/Branson region and are highlighted below.

- ATMS01 - Network Surveillance
- ATMS03 - Surface Street Control
- ATMS06 - Traffic Information Dissemination
- ATMS07 - Regional Traffic Control
- ATMS08 - Incident Management System
- ATMS16 - Parking Facility Management
- ATMS17 - Regional Parking Management

#### **Maintenance and Construction Systems**

The Maintenance and Construction Management market packages monitor and manage roadway infrastructure construction and maintenance activities. These systems manage fleets of maintenance, construction, or special service vehicles (e.g., snow and ice control equipment). These systems also participate in incident response by deploying maintenance and construction resources to an incident scene, in coordination with other agencies. The systems manage the repair and maintenance of both non-ITS and ITS equipment including the traffic controllers, detectors, dynamic message signs, signals,



and other equipment associated with the roadway infrastructure. Additional interfaces to weather information providers are also part of these systems.

- MC03 - Road Weather Data Collection
- MC07 - Roadway Maintenance and Construction
- MC10 - Maintenance and Construction Activity Coordination

### **Advance Public Transportation Systems**

Advance Public Transportation System (APTS) market packages address select needs and issues surrounding the public transportation industry. Issues such as locating, monitoring, operating, and maintaining vehicles are undertaken. There are 8 market packages identified under the National ITS Architecture of which 2 apply to the Springfield/Branson region. A description and diagram detail each packages is shown below.

- APTS01 - Transit Vehicle Tracking
- APTS02 - Transit Fixed-Route Operations

### **Emergency Management Systems**

Emergency Management (EM) market packages typically serve the needs of law enforcement, fire, search and rescue, and HAZMAT operations. The packages also address coordination between the various agencies' personnel, vehicles, and response plans. There are several market packages identified under the National ITS Architecture of which two apply to the Springfield/Branson region and are highlighted below.

- EM1 - Emergency Response
- EM2 - Emergency Routing

### **Advance Traveler Information Systems**

Markets packages under the Advanced Traveler Information Systems (ATIS) category work to supply the traveler with information on existing traffic conditions, weather, construction, maintenance, and special events activities that could impact their travel plans. The information could be supplied in a variety of ways including television, hardware located along the roadway, or through an electronic mechanism. Under the National ITS Architecture there is one package that is applicable to the Springfield/Branson region.

- ATIS2 - Interactive Traveler Information

## **3.4 Regional Market Packages Defined**

Each market package identified for the Springfield/Branson region is described in greater detail here. A short definition, typical graphic showing interconnections between system elements, and list of agencies that would participate or use the package function is provided so a greater understanding of different agency operational roles can be identified.

### 3.4.1 ATMS01 - Network Surveillance

#### National ITS Architecture Definition:

This Market Package includes traffic detectors, environmental sensors, other surveillance equipment, the supporting field equipment, and wireline communications to transmit the collected data back to the Traffic Management Subsystem. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Subsystem). The data generated by this Market Package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Information Service Provider Subsystem.

#### Participating Regional Elements

- Springfield Traffic Management Center
- Springfield Traffic Management Center\_CCTV
- Springfield Traffic Management Center\_Signal System
- Springfield Traffic Management Center\_Personnel

#### National ITS Architecture Graphic:

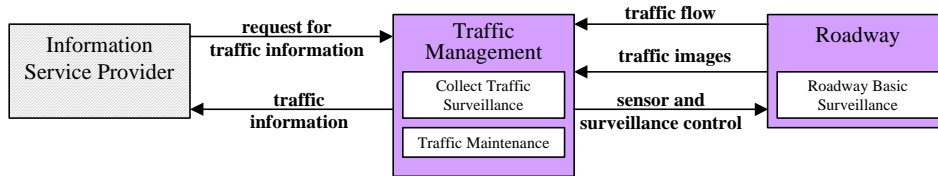


Figure 3-1: ATMS01 - Network Surveillance Market Package

### 3.4.2 ATMS03 - Surface Street Control

National ITS Architecture Definition:	Participating Regional Elements
<p>This market package provides the central control and monitoring equipment, communication links, and the signal control equipment that support local surface street control and/or arterial traffic management. A range of traffic signal control systems are represented by this market package ranging from static pre-timed control systems to fully traffic responsive systems that dynamically adjust control plans and strategies based on current traffic conditions and priority requests. Additionally, general advisory and traffic control information can be provided to the driver while en-route. This market package is generally an intra-jurisdictional package that does not rely on real-time communications between separate control systems to achieve area-wide traffic signal coordination. Systems that achieve coordination across jurisdictions by using a common time base or other strategies that do not require real time coordination would be represented by this package. This market package is consistent with typical urban traffic signal control systems.</p>	<ul style="list-style-type: none"> <li>- Springfield Traffic Management Center</li> <li>- Springfield Traffic Management Center_Personnel</li> <li>- Springfield Traffic Management Center_Signal System</li> </ul>

#### National ITS Architecture Graphic:

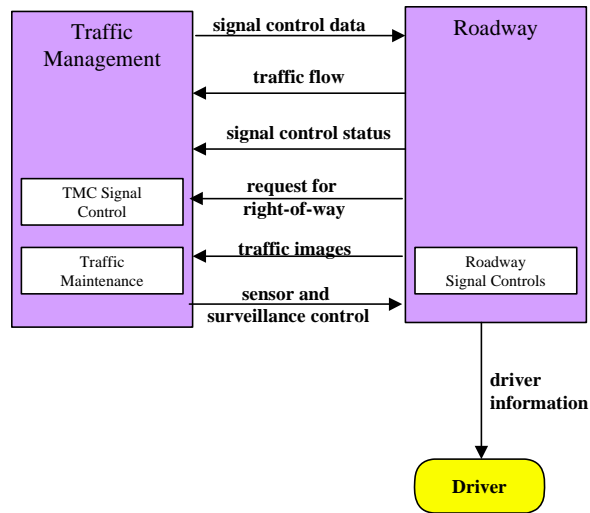


Figure 3-2: ATMS03 - Surface Street Control Market Package

### 3.4.3 ATMS06 - Traffic Information Dissemination

#### National ITS Architecture Definition:

This market package allows traffic information to be disseminated to drivers and vehicles using roadway equipment such as dynamic message signs or highway advisory radio. This package provides a tool that can be used to notify drivers of incidents; careful placement of the roadway equipment provides the information at points in the network where the drivers have recourse and can tailor their routes to account for the new information. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), transit management center, emergency management center, and information service provider.

#### Participating Regional Elements

- Springfield-Greene County\_911 Center
- Springfield Traffic Management Center\_Traveler - Information System
- Springfield Traffic Management Center\_TAR System
- Springfield Traffic Management Center\_DMS System
- Springfield Traffic Management Center
- Local Radio Stations
- Local Television Stations
- Private\_Mediacom
- City of Springfield\_Cable Access

#### National ITS Architecture Graphic:

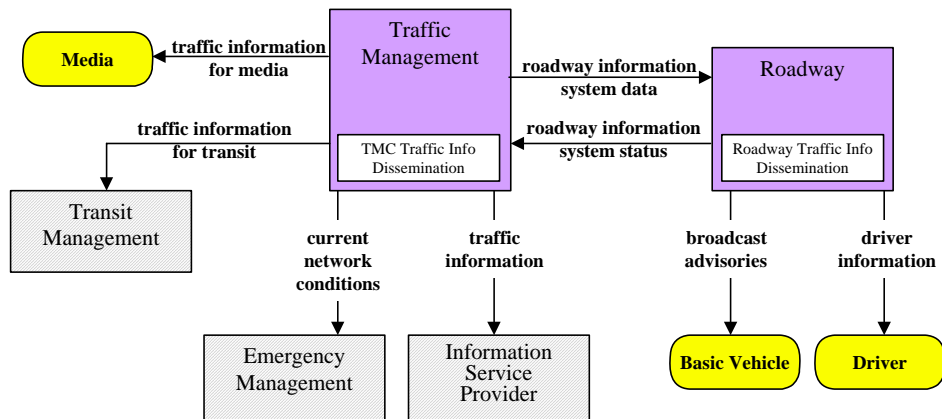


Figure 3-3: ATMS06 - Traffic Information Dissemination Market Package

### 3.4.4 ATMS07 - Regional Traffic Control

#### National ITS Architecture Definition:

This market package advances the Surface Street Control and Freeway Control Market Packages by adding the communications links and integrated control strategies that enable integrated Inter-jurisdictional traffic control. This market package provides for the sharing of traffic information and control among traffic management centers to support a regional control strategy. The nature of optimization and extent of information and control sharing is determined through working arrangements between jurisdictions. This package relies principally on roadside instrumentation supported by the Surface Street Control and Freeway Control Market Packages and adds hardware, software, and wireline communications capabilities to implement traffic management strategies, which are coordinated between allied traffic management centers. Several levels of coordination are supported from sharing of information through sharing of control between traffic management centers.

#### Participating Regional Elements

- MoDOT\_District Office
- Springfield Traffic Management Center
- Springfield Traffic Management Center\_Signal System

#### National ITS Architecture Graphic:

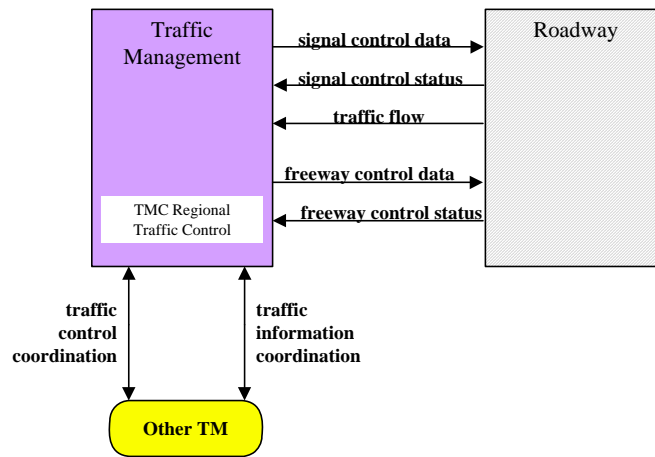


Figure 3-4: ATMS07 - Regional Traffic Control Market Package

### 3.4.5 ATMS08 - Incident Management System

#### National ITS Architecture Definition:

This market package manages both predicted and unexpected incidents so that the impact to the transportation network and traveler safety is minimized. Requisite incident detection capabilities are included in the freeway control market package and through the regional coordination with other traffic management and emergency management centers, weather service entities, and event promoters supported by this market package. Information from these diverse sources are collected and correlated by this market package to detect and verify incidents and implement an appropriate response. This market package provides Traffic Management Subsystem equipment that supports traffic operations personnel in developing an appropriate response in coordination with emergency management and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications and presentation of traffic information to affected travelers using the Traffic Information Dissemination market package.

#### Participating Regional Elements

- MoDOT\_District Office
- Private\_Burlington North-Santa Fe Rail
- Springfield Traffic Management Center
- Springfield-Greene County\_911 Center

#### National ITS Architecture Graphic:

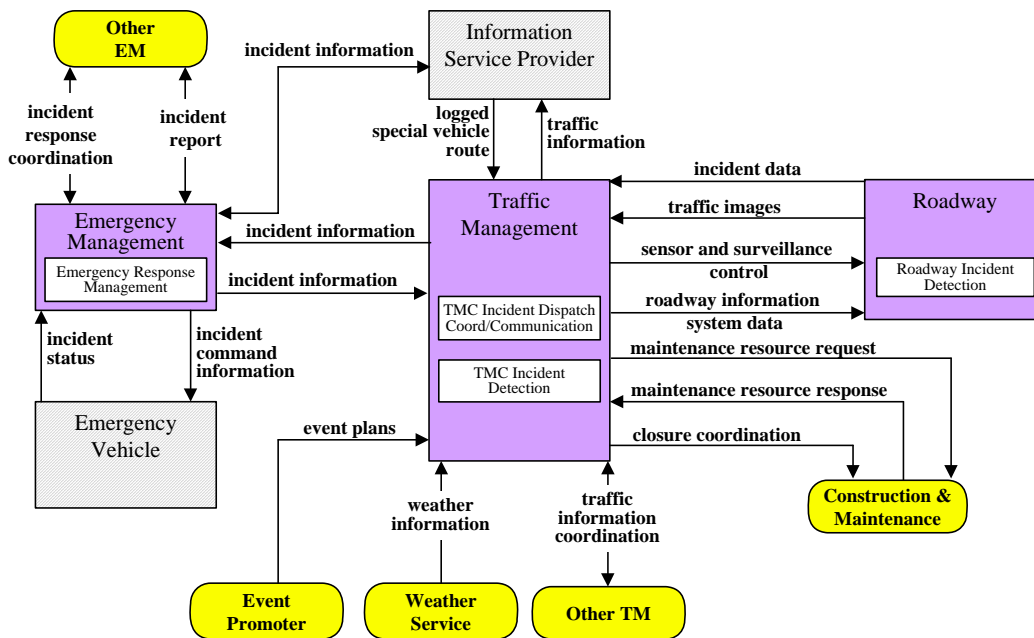


Figure 3-5: ATMS08 - Incident Management System Market Package

### 3.4.6 ATMS16 - Parking Facility Management

#### National ITS Architecture Definition:

This market package provides enhanced monitoring and management of parking facilities. The included equipment assists in the management of parking operations, coordinates with transportation authorities, and supports electronic collection of parking fees. This is performed by sensing and collecting current parking facilities status, sharing the data with information service providers and traffic operations, and automatic fee collection using short-range communications with the same in-vehicle equipment utilized for electronic toll collection.

#### Participating Regional Elements

- City of Springfield\_Parking Structure Management
- City of Springfield\_Parking Structure Management\_Operator

#### National ITS Architecture Graphic:

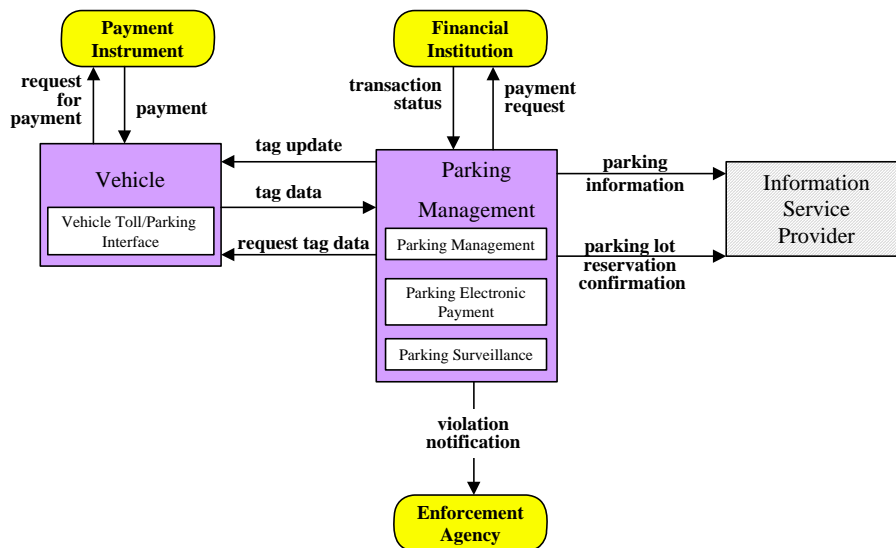


Figure 3-6: ATMS16 - Parking Facility Management Market Package

### 3.4.7 ATMS17 - Regional Parking Management

#### National ITS Architecture Definition:

This market package supports coordination between parking facilities to enable regional parking management strategies.

#### Participating Regional Elements

- City of Springfield\_Parking Structure Management
- Private\_Parking Structures Facilities
- Springfield Traffic Management Center

#### National ITS Architecture Graphic:

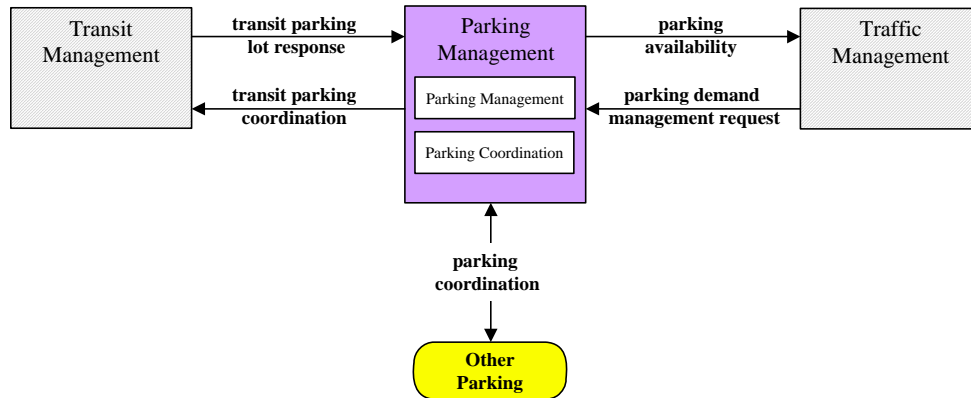


Figure 3-7: ATMS17 - Regional Parking Management Market Package





### 3.4.9 MC07 - Roadway Maintenance and Construction

#### National ITS Architecture Definition:

This market package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way. Maintenance services would include landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, CCTV, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling maintenance and construction activities.

#### Participating Regional Elements

- City of Springfield\_Maintenance Shop
- City of Springfield\_Maintenance Shop\_Field Staff
- City of Springfield\_Maintenance Shop\_Personnel
- County of Greene\_Highway Department
- County of Greene\_Highway Department\_Field Staff
- County of Greene\_Highway Department\_Personnel
- MoDOT\_Maintenance Department
- MoDOT\_Maintenance Department\_Field Staff
- MoDOT\_Maintenance Department\_Personnel
- Springfield Traffic Management Center

#### National ITS Architecture Graphic:

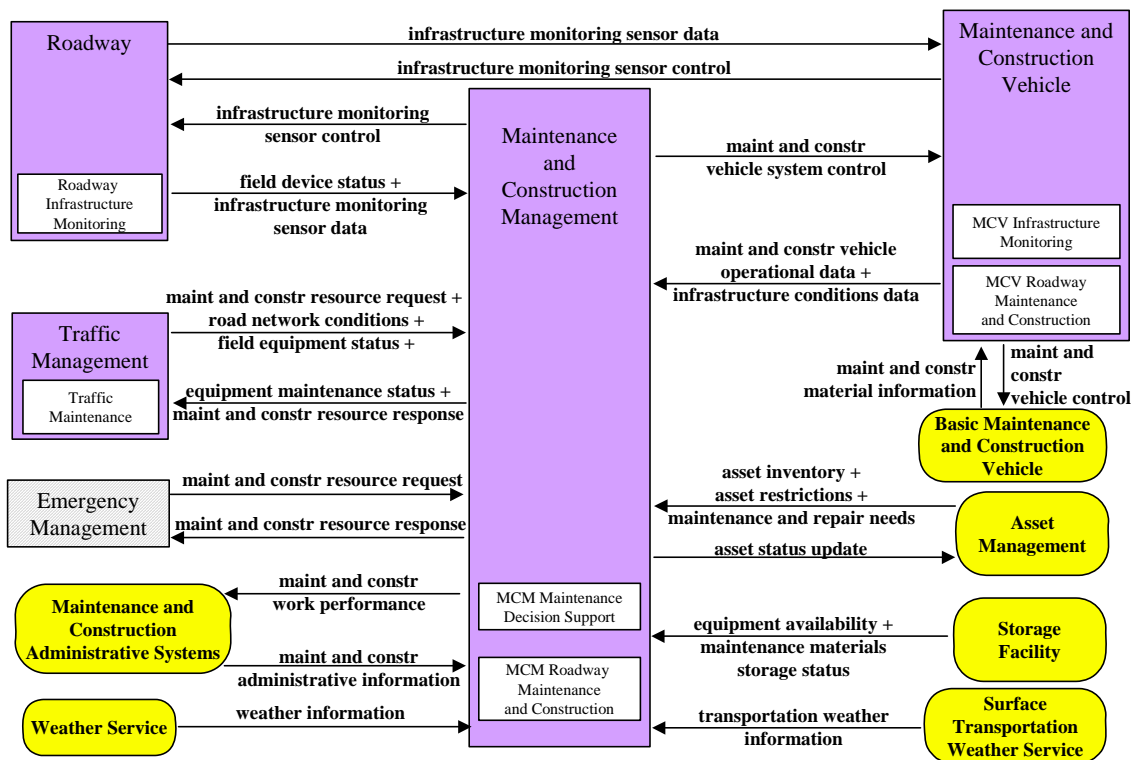


Figure 3-9: MC07 – Roadway Maintenance and Construction Market Package

### 3.4.10 MC10 - Maintenance and Construction Activity Coordination

#### National ITS Architecture Definition:

This market package supports the dissemination of maintenance and construction activity to centers which can utilize it as part of their operations, or to the Information Service Providers who can provide the information to travelers.

#### Participating Regional Elements

- City Utilities\_Transit
- City of Springfield\_Public Works Service Center
- County of Greene\_Highway Department
- MoDOT\_Maintenance Department
- Southwest Missouri State University\_Transit
- Springfield Traffic Management Center

#### National ITS Architecture Graphic:

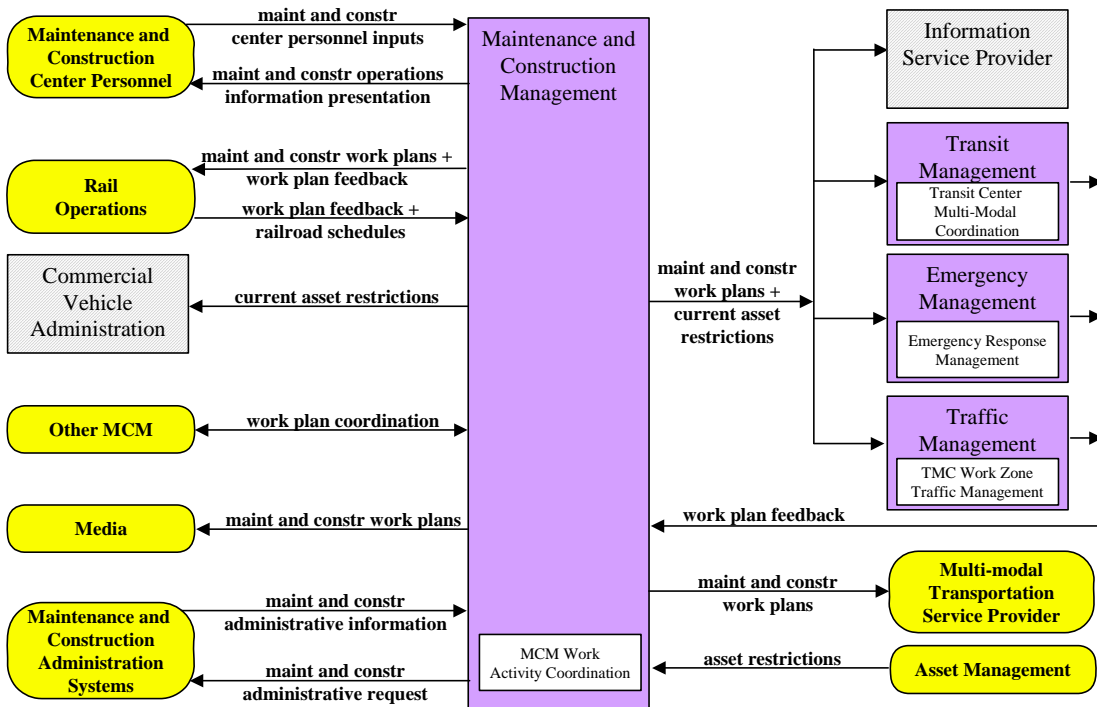


Figure 3-10: MC10 – Maintenance and Construction Activity Coordination Market Package

### 3.4.11 APTS01 - Transit Vehicle Tracking

#### National ITS Architecture Definition:

This market package provides for an Automated Vehicle Location System to track the transit vehicle's real time schedule adherence and updates the transit system's schedule in real-time. Vehicle position may be determined either by the vehicle (e.g., through GPS) and relayed to the infrastructure or may be determined directly by the communications infrastructure. A two-way wireless communication link with the Transit Management Subsystem is used for relaying vehicle position and control measures. Fixed route transit systems may also employ beacons along the route to enable position determination and facilitate communications with each vehicle at fixed intervals. The Transit Management Subsystem processes this information, updates the transit schedule and makes real-time schedule information available to the Information Service Provider Subsystem via a wireline link.

#### Participating Regional Elements

- City Utilities\_Transit
- City Utilities\_Transit\_Vehicle

#### National ITS Architecture Graphic:

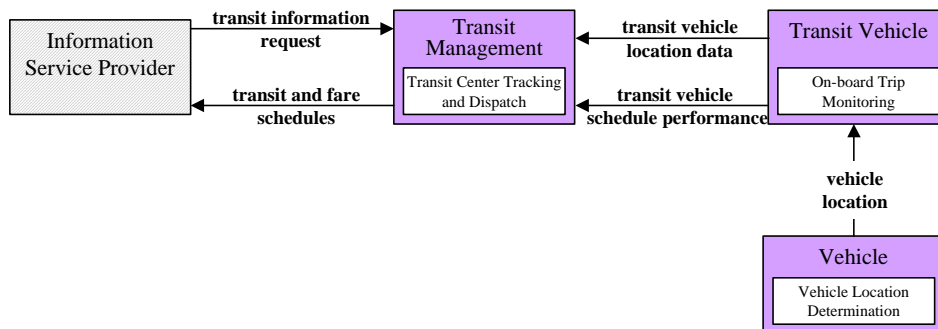


Figure 3-11: APTS01 - Transit Vehicle Tracking Market Package

### 3.4.12 APTS02 - Transit Fixed-Route Operations

National ITS Architecture Definition:	Participating Regional Elements
<p>This market package performs automatic driver assignment and monitoring, as well as vehicle routing and scheduling for fixed-route services. This service uses the existing AVL database as a source for current schedule performance data, and is implemented through data processing and information display at the transit management subsystem. This data is exchanged using the existing wireline link to the information service provider where it is integrated with that from other transportation modes (e.g. rail, ferry, air) to provide the public with integrated and personalized dynamic schedules.</p>	<ul style="list-style-type: none"> <li>- City Utilities_Transit</li> <li>- City Utilities_Transit_Personnel</li> <li>- City Utilities_Transit_Vehicle</li> </ul>

#### National ITS Architecture Graphic:

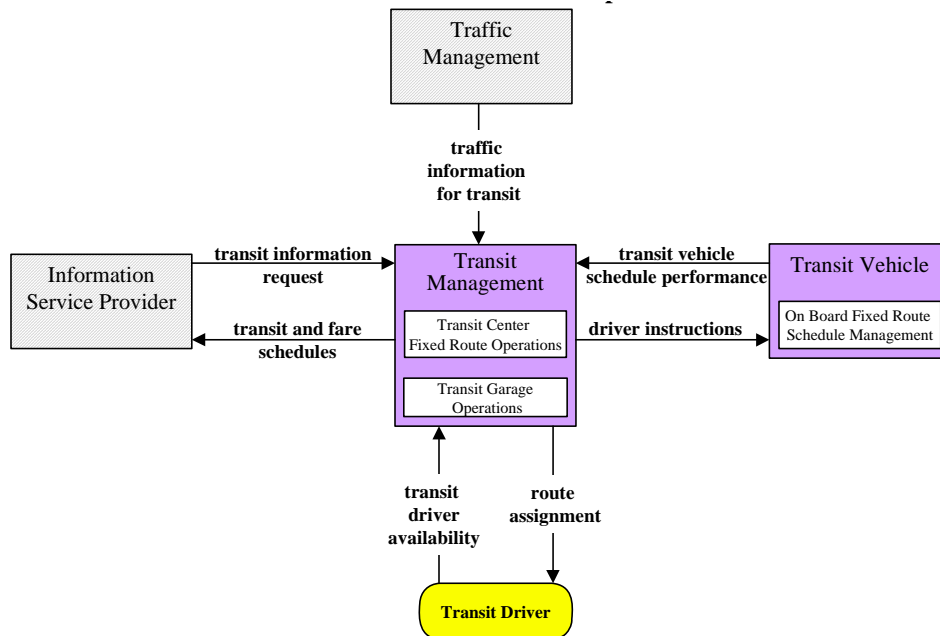


Figure 3-12: APTS02 - Transit Fixed-Route Operations Market Package

### 3.4.13 EM1 - Emergency Response

#### National ITS Architecture Definition:

This market package includes emergency vehicle equipment, equipment used to receive and route emergency calls, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. Coordination between Emergency Management Subsystems supports emergency notification and coordinated response between agencies. Existing wide area wireless communications would be utilized between the Emergency Management Subsystem and an Emergency Vehicle to enable an incident command system to be established and supported at the emergency location. Public safety, traffic management, and many other allied agencies may each participate in the coordinated response managed by this package.

#### Participating Regional Elements

- City of Springfield\_Fire Department
- City of Springfield\_Fire Department\_Personnel
- City of Springfield\_Fire Department\_Vehicles
- Springfield-Greene County\_Office of Emergency Management
- City of Springfield\_Police Department
- City of Springfield\_Police Department\_Personnel
- City of Springfield\_Police Department\_Vehicles
- County of Greene\_Sheriffs Department
- County of Greene\_Sheriffs Department\_Operators
- County of Greene\_Sheriffs Department\_Vehicles
- Emergency Response Vehicles
- Springfield Traffic Management Center
- Springfield-Greene County\_911 Center
- Springfield-Greene County\_911 Center\_Operators
- State of Missouri\_Highway Patrol
- State of Missouri\_Highway Patrol\_Operators

#### National ITS Architecture Graphic:

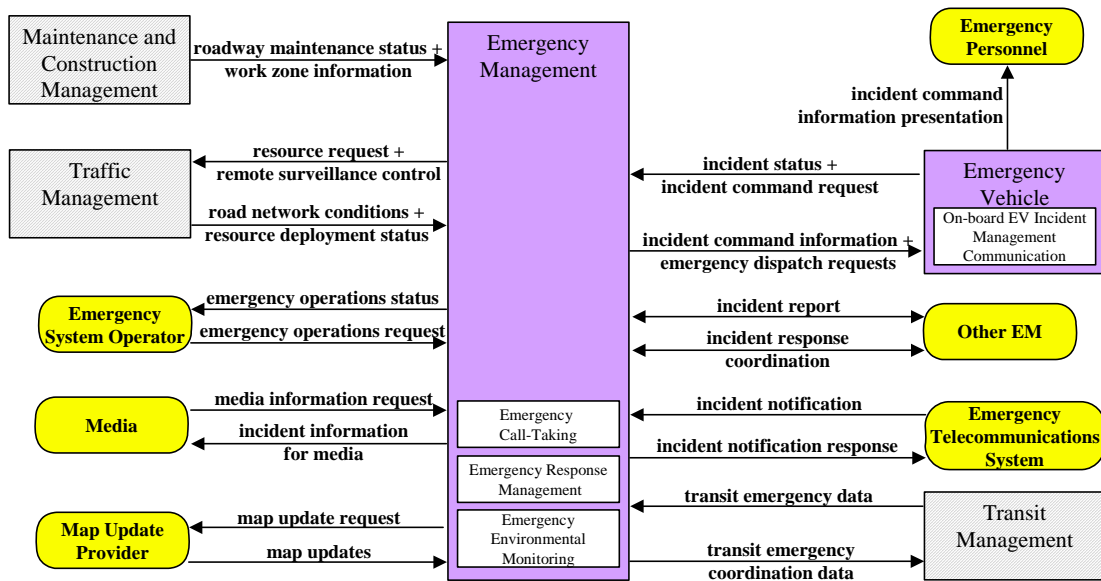


Figure 3-13: EM1 - Emergency Response Market Package

### 3.4.14 EM2 - Emergency Routing

#### National ITS Architecture Definition:

This market package supports automated vehicle location and dynamic routing of emergency vehicles. The service also supports coordination with the Traffic Management Subsystem, collecting detailed road network conditions and requesting special priority or other specific emergency traffic control strategies on the selected route(s). The Emergency Management Subsystem provides the routing for the emergency fleet based on real-time traffic conditions. The Emergency Vehicle may also be equipped with dedicated short range communications for local signal preemption. The service provides for information exchange between care facilities and both the Emergency Management Subsystem and emergency vehicles.

#### Participating Regional Elements

- Private\_Cox Health Systems
- Private\_St. John's Regional Health Systems
- Springfield Traffic Management Center

#### National ITS Architecture Graphic:

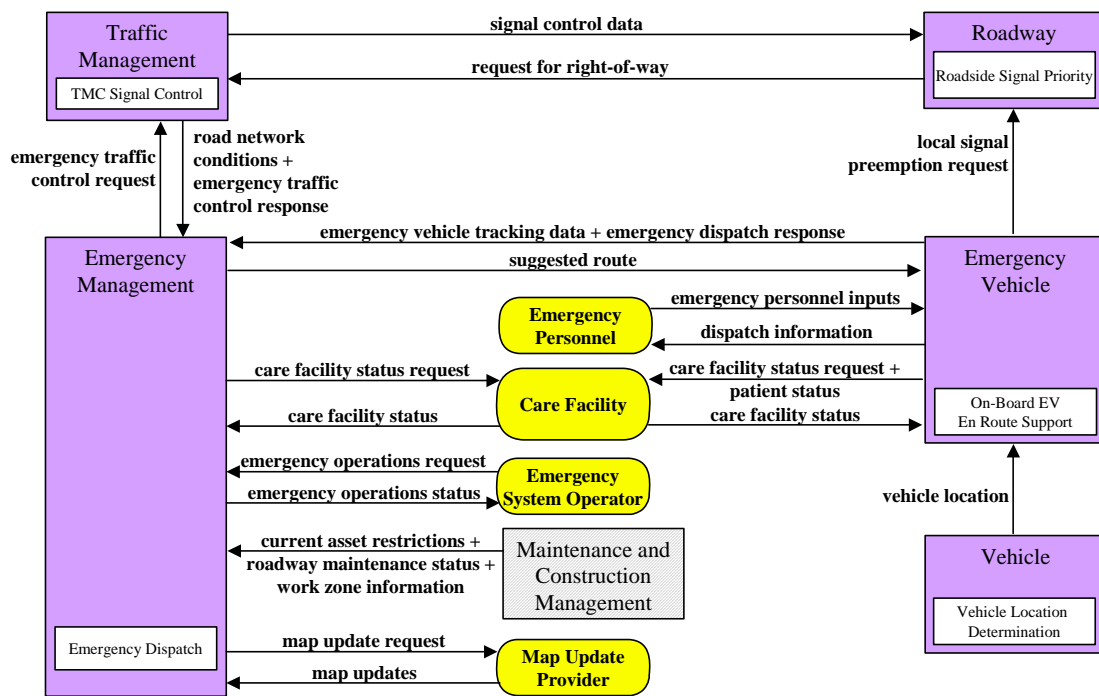


Figure 3-14: EM2 - Emergency Routing Market Package

### 3.4.15 ATIS2 - Interactive Traveler Information

#### National ITS Architecture Definition:

This market package provides tailored information in response to a traveler request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported. The traveler can obtain current information regarding traffic conditions, transit services, ride share/ride match, parking management, and pricing information. A range of two-way wide-area wireless and wireline communications systems may be used to support the required data communications between the traveler and Information Service Provider...

#### Participating Regional Elements

- Remote Traveler Support
- Springfield Traffic Management Center

#### National ITS Architecture Graphic:

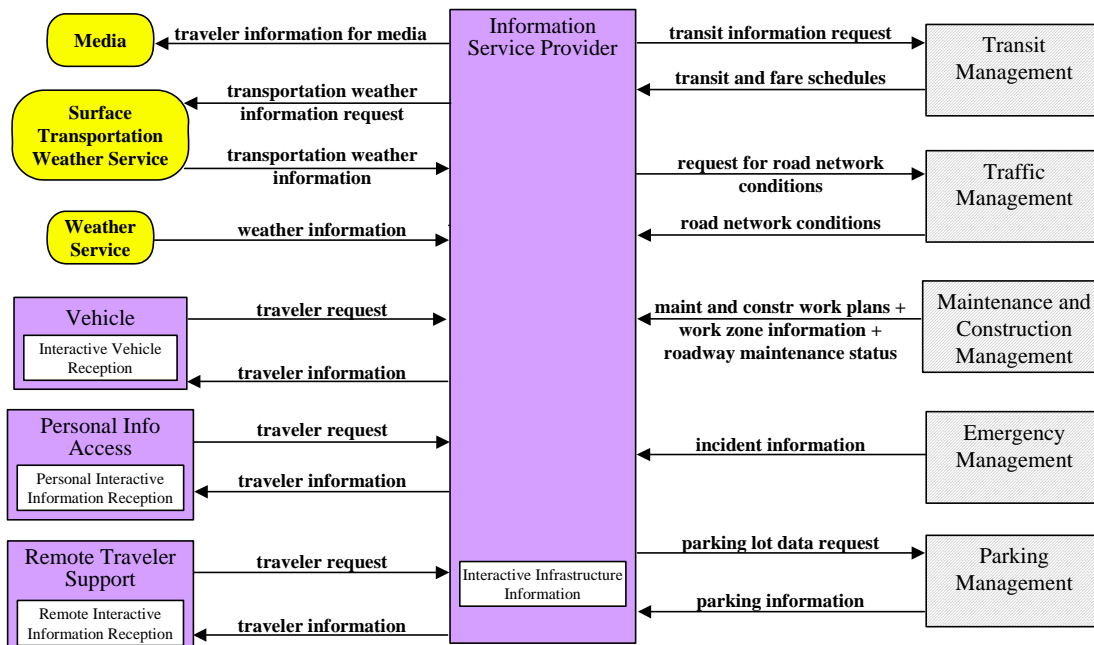


Figure 3-15: ATIS2 - Interactive Traveler Information Market Package



## 4 Agreements

Existing agreements and the need for memorandum of understanding between the City of Springfield, the Missouri Department of Transportation and various transportation stakeholders were discussed in the October 9, 2004 workshop. Agreements among the different stakeholders, agencies and organizations are required to realize the integration shown in the Springfield/Branson Regional ITS architecture. To date there are no written agreements in place for the Springfield/Branson region. Informal agreements exist between the City and media outlets. As the regional architecture progresses in the region the formalization of information sharing activities should become a priority.

As future guidance for the Missouri Department of Transportation, the City of Springfield, and regional partners the following material provides guidance for agreements and information for long-range operations and information sharing agreements.

Type of Agreement	Description
Handshake Agreement	<ul style="list-style-type: none"> <li>• Early agreement between one or more partners</li> <li>• Not recommended for long term operations.</li> </ul>
Memorandum of Understanding	<ul style="list-style-type: none"> <li>• Initial agreement used to provide minimal detail and usually demonstrating a general consensus.</li> <li>• Used to expand a more detailed agreement like a Interagency Agreement which may be broad in scope but contains all of the standard contract clauses required by a specific agency.</li> <li>• May serve as a means to modify a much broader Master Funding Agreement, allowing the master agreement to cover various ITS projects throughout the region and the MOUs to specify the scope and differences between the projects.</li> </ul>
Interagency Agreement	<ul style="list-style-type: none"> <li>• Between public agencies (e.g., transit authorities, cities, counties, etc.) for operations, services or funding</li> <li>• Documents responsibility, functions and liability, at a minimum. Intergovernmental Agreement.</li> <li>• Between governmental agencies (<i>e.g., Agreements between universities and State DOT, MPOs and State DOT, etc.</i>)</li> </ul>
Operational Agreement	<ul style="list-style-type: none"> <li>• Between any agency involved in funding, operating, maintaining or using the right-of-way of another public or private agency</li> <li>• Identifies respective responsibilities for all activities associated with shared systems being operated and/or maintained</li> </ul>
Funding Agreement	<ul style="list-style-type: none"> <li>• Documents the funding arrangements for ITS projects (<i>and other projects</i>)</li> <li>• Includes at a minimum standard funding clauses, detailed scope, services to be performed, detailed project budgets, etc</li> </ul>
Master Agreements	<ul style="list-style-type: none"> <li>• Standard contract and/or legal verbiage for a specific agency and serving as a master agreement by which all business is done. These agreements can be found in the legal department of many public agencies</li> <li>• Allows states, cities, transit agencies, and other public agencies that do business with the same agencies over and over (<i>e.g., cities and counties</i>) to have one <i>Master Agreement</i> that uses smaller agreements (<i>e.g., MOUs, Scope-of-Work and Budget Modifications, Funding Agreements, Project Agreements, etc.</i>) to modify or expand the boundaries of the larger agreement to include more specific language.</li> </ul>

## 5 System Functional Requirements

System functional requirements are high-level or detailed definitions of system utilities or resources that support ITS services. Requirements provide a list of statements that define major functions and support regional deployment and integration of various services. Functional requirements are generally provided in a text-based format as a series of statements.

Detailed system requirements are developed during ITS project scope and later integrated into the project design. When developing a regional architecture functional requirements are generic and typically developed at a high level. The purpose of the regional architecture is to determine what ITS services are needed for the region and which ITS systems support them.

### 5.1 System Functional Requirements – Equipment Package Approach

System functional requirements for the Springfield/Branson region were determined by identifying existing and future ITS systems within the region and associating them with the National ITS Architecture “Market Packages”. Market packages are a collection of different products and services that work together to address transportation needs or issues. To illustrate what a market package is consider an office workstation. A typical workstation has a monitor, keyboard, mouse, central processor, software, etc. Much like a market package the workstation is a collection of different products working together to address a need.

Market packages by themselves only provide a limited amount of information on what functions an ITS system provides. As in our example a workstation package does not detail what functions that system can provide. To provide more detail “equipment packages” can be used to detail the individual components that make up the overall market package. Again in our example the mouse, keyboard, and monitor are each equipment packages that make up the larger market package. Generating requirements for the monitor design or mouse configuration would provide a more detailed workstation description or essentially better system functional requirements.

The National ITS Architecture provides a list of previously identified and documented market packages as well as the equipment packages that support them for common transportation related functions. Equipment packages are further documented and defined in greater detail using process specifications (PSpec), which provide a complete set of inputs and outputs.

### 5.2 Regional Market Packages

To begin the process of defining the regional system requirements National ITS Architecture market packages that address local needs and issues were identified. Fifteen different packages covering advance traffic management, maintenance and construction management, advance public transportation, emergency management and advance traveler information systems were needed to support regional transportation functions. The market packages identified as applicable for the Springfield/Branson region are listed below:

- ATMS01 - Network Surveillance

- ATMS03 - Surface Street Control
- ATMS06 - Traffic Information Dissemination
- ATMS07 - Regional Traffic Control
- ATMS08 - Incident Management System
- ATMS16 - Parking Facility Management
- ATMS17 - Regional Parking Management
- MC03 - Road Weather Data Collection
- MC07 - Roadway Maintenance and Construction
- MC10 - Maintenance and Construction Activity Coordination
- APTS01 - Transit Vehicle Tracking
- APTS02 - Transit Fixed-Route Operations
- EM1 - Emergency Response
- EM2 - Emergency Routing
- ATIS2 - Interactive Traveler Information

### **5.3 Regional Functional Requirements**

Functional requirements for the region consist of identifying the agencies associated with each market package and then identifying the associated equipment packages that are applicable to the agency's operations. The process is relatively straight forward as the National ITS Architecture has already established the equipment packages associated with each market package. Furthermore Section 3 "Operational Concept" has also associated each of the agencies with applicable market packages for the Springfield/Branson region. Not all of the equipment packages are applicable when defining the functional requirements for each agency and they only provide a high-level functional view. However, those equipment packages that are pertinent can be further broken down using the National Architecture into Process Specifications (Pspecs) and data flows that provide a higher degree of functional detail. Agencies and their associated functional requirements are presented below:

## 5.3.1 Springfield Traffic Management Center Functional Requirements

### 1-Collect Traffic Surveillance

This Equipment package collects, stores, and provides electronic access to the traffic surveillance data.

### 2-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.

### 3-Roadway Basic Surveillance

This Equipment package provides the capabilities to monitor traffic flow in major intersections and on main highways for urban areas and to monitor road conditions using fixed equipment such as loop detectors and wire-line communication.

### 4-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.).

### 5-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.

### 6-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.

### 7-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.

### 8-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.).

### 9-Roadway Traffic Information Dissemination

This Equipment package provides the roadside elements of traffic information dissemination including DMS, HAR, and talking pedestrian signs.

### 10-TMC Traffic Information Dissemination

This Equipment package provides the capability to disseminate incident related information to travelers, potential travelers, and private information service providers. These capabilities shall be provided using a workstation type processor within a facility connected to traveler information providers by utilizing existing wireline links.

**11-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.

**12-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.

**13-Emergency Response Management**

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.

**14-Roadway Incident Detection**

This Equipment package provides incident detection capability to reside at the roadside. For example, advanced CCTV's with built-in incident detection algorithms would allow the actual detection function to be roadside rather than transmitting images to a center for visual or automated detection.

**15-TMC Incident Detection**

This Equipment package provides the capability to traffic managers to detect and verify incident. This capability includes analyzing and reducing the collected data from traffic surveillance equipment, including planned incidents and hazardous conditions.

**16-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.

**17-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.

**18-Roadside Signal Priority**

This Equipment package shall provide the capability to receive vehicle signal priority requests and control roadside signals accordingly.

## 5.3.2 Springfield-Greene County 911 Center Functional Requirements

### 1-TMC Traffic Information Dissemination

This Equipment package provides the capability to disseminate incident related information to travelers, potential travelers, and private information service providers. These capabilities shall be provided using a workstation type processor within a facility connected to traveler information providers by utilizing existing wireline links.

### 2-Emergency Response Management

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.

### 3-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.

## 5.3.3 MoDOT District Office Functional Requirements

### 1-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.

### 2-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.).

### 3-TMC Incident Detection

This Equipment package provides the capability to traffic managers to detect and verify incident. This capability includes analyzing and reducing the collected data from traffic surveillance equipment, including planned incidents and hazardous conditions.

## 5.3.4 City of Springfield Public Works Service Center Functional Requirements

### 1-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.

### 2-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.

## 5.3.5 MoDOT Maintenance Department Functional Requirements

### 1-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

### 2-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.

### 3-MCM Environmental Information Processing

This equipment package processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. The processed environmental information products are presented to the user

### 4-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

### 5-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.

## 5.3.6 County of Greene Highway Department Functional Requirements

### 1-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

### 2-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.

### 3-MCM Environmental Information Processing

This equipment package processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. The processed environmental information products are presented to the user

### 4-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

### 5-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.

## 5.3.7 City of Springfield Parking Management Functional Requirements

### 1-Parking Electronic Payment

This Equipment package supports electronic payment of parking fees.

### 2-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. Wireline communications with clearinghouse operators (the Financial Institution terminator) enable processing of financial transactions.

### 3-Parking Surveillance

This Equipment package provides the capability to detect and classify vehicles entering and exiting the parking facility and measures parking facility occupancy to support parking operations and traveler information services.

### 4-Parking Coordination

This equipment package supports communication and coordination between equipped parking facilities and also supports regional coordination between parking facilities and traffic and transit management



systems. Information including current parking availability, system status, and operating strategies are shared through this equipment package to enable local parking facility management that supports regional transportation strategies.

## **5.3.8 City Utilities-Transit Functional Requirements**

### **1-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 driver and a facility, two-way data communication between the transit vehicles and a facility.

### **2-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

### **3-Vehicle Location Determination**

This equipment package determines current location information and provides this information to other equipment packages that use the location information to provide various ITS services.

### **4-Transit Center Fixed-Route Operations**

This Equipment package enhances the planning and scheduling associated with fixed route transit services. The package allows fixed-route 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.

### **5-Transit Garage Operations**

This Equipment package automates and supports the assignment of transit vehicles and drivers to enhance the daily operation of a transit service. It provides the capability to assign drivers to routes or service areas in a fair manner while minimizing labor and overtime services, considering driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver.

### **6-On-board Fixed Route Schedule Management**

This Equipment package provides the capabilities for automated 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 driver 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.

### 5.3.9 Other Emergency Management Agencies Functional Requirements

The following functional requirements applies to the following emergency management agencies:

- City of Springfield Fire Department
- City of Springfield Police Department
- County of Greene Sheriffs Department
- State of Missouri Highway Patrol
- Springfield-Greene County Office of Emergency Management

#### 1-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.

#### 2-Emergency Response Management

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.

#### 3-On-board EV Incident Management Communication

This Equipment package provides a direct interface between the emergency vehicle and incident management personnel.

### 5.3.10 Miscellaneous Media Agencies Functional Requirements

The following functional requirements applies to the following media agencies:

- Local Radio Stations
- Local Television Stations
- Mediacom
- City of Springfield Cable Access

#### 1-Roadway Traffic Information Dissemination

This Equipment package provides the roadside elements of traffic information dissemination.

[Appendix A](#) contains each specific equipment packages referenced in this section and supplies additional detail including lists of Pspecs that would support there deployment. Additional information on Pspecs and equipment packages can be found by referencing the National ITS Architecture.

## 6 Interface Requirements

Interface requirements for the Springfield/Branson region involve detailed diagrams of agency interactions and information exchanges. There are three types of diagrams that describe at various levels the connections and associations between the various regional agency stakeholder elements. Each diagram is explained here in greater detail with each stakeholder's representative diagrams illustrated in [Appendix B](#).

### 6.1 Sausage Diagram

The “Sausage Diagram” is considered the top-level interconnect diagram for the National ITS Architecture. It illustrates how different subsystems interface and the communication methods that facilitate the data exchanges between them. As a top-level diagram it only shows the interconnection between different subsystems, and does not providing specific details on the exact information and data exchanged. The following is the sausage diagram for the Springfield/Branson region.

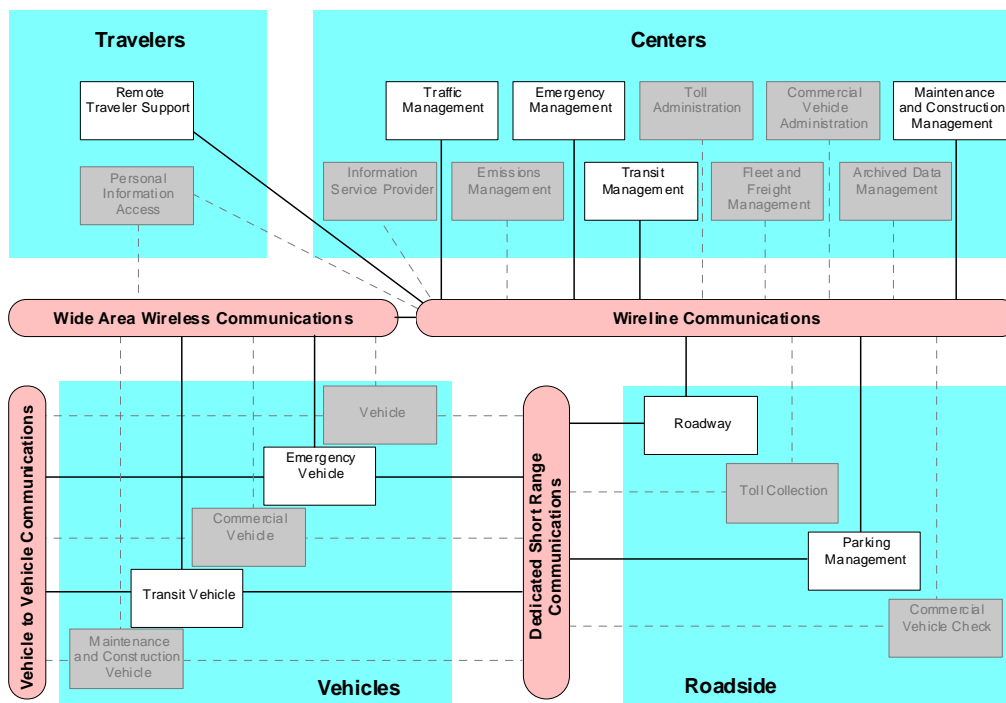
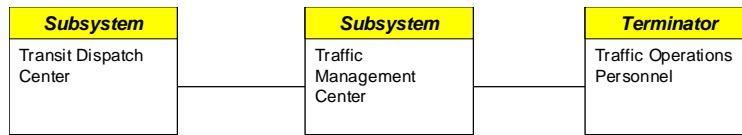


Figure 6-1: Sausage Diagram of Springfield/Branson Regional ITS Elements

### 6.2 Interconnect Flow Diagram

The interconnect flow diagram highlights the communication interaction between multiple subsystems or between a subsystem and terminators. The diagram details communication paths between the architecture elements showing how information is routed. The type of communications system reflected by the interconnect flow can be one of four types that include wireline, wide area wireless, dedicated short range, or vehicle to vehicle. Additional communications types such as human and physical/environmental interfaces can also be represented by interconnect flows.

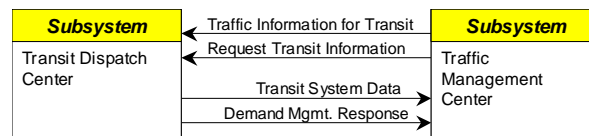


**Figure 6-2: Typical Interconnect Diagram**

Each regional stakeholder has a representative interconnect diagram with details the other agency subsystems they currently or will connect to in the future. These diagrams can be found in [Appendix B](#).

### 6.3 Architecture Flow Diagram

The architecture flow diagram further elaborates on the information provided by the interconnect flow diagram. Whereas, the interconnect diagram indicates the communication path between elements the architecture flow diagram details the information exchanged on that path. Typically a single interconnect flow represent one or more architecture flows, which detail the type and direction information exchanges on the interconnect take between subsystems or terminators in the system.



**Figure 6-3: Typical Architecture Flow Diagram**

Each regional stakeholder has a representative architecture flow diagram with details the other agency subsystems they communicate now or in the future along with the information to be exchanged. These diagrams can be found in [Appendix B](#).

## 7 Standards

ITS Standards are fundamental to the establishment of an open ITS environment that achieves the goals originally envisioned by the U.S. Department of Transportation. Standards facilitate deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances and new approaches evolve.

Standards help create competition, better products, and lower prices. The example that best exhibits this is the telecommunications and computer industries. The openness of the ITS Architecture standards allow considerable latitude in the selection of technologies for use in systems, and also urges manufactures to continually improve their products and develop new ones. ITS standards:

- Facilitate interoperability of basic functionality
- Promote system integration
- May be linked to federal funding in the future

Standards can be applied to the different elements of intelligent transportation systems:

- ITS Standards
- Communication standards
- Data standards
- Message set standards
- Equipment Standards
- Software Standards

### 7.1 Standard Development Organizations

The U.S. Department of Transportation's ITS Joint Program Office is supporting SDOs (Standards Development Organizations) with an extensive, multi-year program of accelerated standards development to facilitate successful ITS deployment. The program is supporting and accelerating the ITS consensus-based volunteer standards processes that are underway in the U.S.

The following is a list of the current standard development organizations working on developing ITS standards:

- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- Electronic Industries Alliance (EIA)
- Institute of Electrical and Electronics Engineers (IEEE)
- Institute of Transportation Engineers (ITE)
- Society of Automotive Engineers (SAE)
- National Transportation Communications for ITS Protocol (NTCIP)

NTCIP is a joint product of the National Electronics Manufacturers Association (NEMA), the American Association of State Highway and Transportation Officials (AASHTO), and the Institute of Transportation Engineers (ITE).

### 7.2 NTCIP Standards

NTCIP is a family of standards that provides both the rules for communicating (called protocols) and the vocabulary (called objects) necessary to allow electronic traffic control equipment from different manufacturers to operate with each other as a system. NTCIP

is the first set of standards for the transportation industry that allows traffic control systems to be built using a "mix and match" approach with equipment from different manufacturers. Therefore, NTCIP standards reduce the need for reliance on specific equipment vendors and customized one-of-a-kind software. To assure both manufacturer and user community support, NTCIP is jointly developed by NEMA, AASHTO, and ITE.

### 7.3 Applicable Standards for Springfield/Branson Regional ITS Architecture

Looking at the ITS Standards as a foundation for building the systems identified in the regional architecture, [Table 7-1](#) highlights the applicable standards for the Springfield/Branson Regional ITS Architecture and indicates its status.

**Table 7-1: Springfield/Branson Regional ITS Standards**

Lead SDO	Standard Name	Document ID
AASHTO/ITE/NEMA	Global Object Definitions	NTCIP 1201
AASHTO/ITE/NEMA	Object Definitions for Actuated Traffic Signal Controller Units	NTCIP 1202
AASHTO/ITE/NEMA	Object Definitions for Dynamic Message Signs	NTCIP 1203
AASHTO/ITE/NEMA	Object Definitions for Environmental Sensor Stations & Roadside Weather Information System	NTCIP 1204
AASHTO/ITE/NEMA	Data Dictionary for Closed Circuit Television (CCTV)	NTCIP 1205
AASHTO/ITE/NEMA	Object Definitions for Video Switches	NTCIP 1208
AASHTO/ITE/NEMA	Transportation System Sensor Objects	NTCIP 1209
AASHTO/ITE/NEMA	Objects for Signal Systems Master	NTCIP 1210
AASHTO/ITE/NEMA	Objects for Signal Control Priority	NTCIP 1211
AASHTO/ITE/NEMA	Message Set for Weather Reports	NTCIP 1301
AASHTO/ITE/NEMA	TCIP - Common Public Transportation (CPT) Business Area Standard	NTCIP 1401
AASHTO/ITE/NEMA	TCIP - Incident Management (IM) Business Area Standard	NTCIP 1402
AASHTO/ITE/NEMA	TCIP - Passenger Information (PI) Business Area Standard	NTCIP 1403
AASHTO/ITE/NEMA	TCIP - Spatial Representation (SP) Business Area Standard	NTCIP 1405
AASHTO/ITE/NEMA	TCIP - Onboard (OB) Business Area Standard	NTCIP 1406
AASHTO/ITE/NEMA	TCIP - Control Center (CC) Business Area Standard	NTCIP 1407
AASHTO/ITE/NEMA	TCIP - Fare Collection (FC) Business Area Standard	NTCIP 1408
AASHTO/ITE/NEMA	NTCIP Center-to-Center Standards Group	See Footnotes
AASHTO/ITE/NEMA	NTCIP Center-to-Field Standards Group	See Footnotes
ASTM	Standard Specification for 5.9 GHz Data Link Layer	ASTM 5 GHz Data Link
ASTM	Standard Specification for 5.9 GHz Physical Layer	ASTM 5 GHz Phys
ASTM	Specification for Dedicated Short Range Communication (DSRC) Data Link Layer: Medium Access and Logical Link Control	ASTM PS 105-99
ASTM	Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz	ASTM PS 111-98
IEEE	Standard for Traffic Incident Management Message Sets for Use by EMCs	IEEE P1512.1
IEEE	Standard for Public Safety IMMS for use by EMCs	IEEE P1512.2
IEEE	Standard for Hazardous Material IMMS for use by EMCs	IEEE P1512.3
IEEE	Standard for Emergency Management Data Dictionary	IEEE P1512.a
IEEE	Standard for Common Incident Management Message Sets (IMMS) for use by EMCs	IEEE P1512-2000
IEEE	Security/Privacy of Vehicle/RS Communications including Smart Card Communications	IEEE P1556
ITE	Standard for Functional Level Traffic Management Data Dictionary (TMDD)	ITE TM 1.03
ITE	Message Sets for External TMC Communication (MS/ETMCC)	ITE TM 2.01
SAE	Data Dictionary for Advanced Traveler Information System (ATIS)	SAE J2353
SAE	Message Set for Advanced Traveler Information System (ATIS)	SAE J2354
SAE	Rules for Standardizing Street Names and Route IDs	SAE J2529
SAE	Messages for Handling Strings and Look-Up Tables in ATIS Standards	SAE J2540

## 8 Project Sequencing

Both the traditional planning process and the regional ITS architecture process have the same goal: to use a local knowledge and consensus process to determine the best sequence of projects to create a transportation network that best meets the needs of the region. The regional ITS architecture is implemented with many individual ITS projects, stakeholders, and private sector initiatives over several years. The architecture assists in this process by establishing a sequence, or ordering, of ITS projects that contributes to the integrated regional transportation system. This system is what is depicted in the regional ITS architecture. For the Springfield/Branson region, a sequence of projects defined in the short term is defined in the architecture and those project are defined in the following sequencing table.

Project	Legacy	Expansion/ New	Begin Date	End Date
<b>FREEWAY MANAGEMENT</b>				
Operations Center (Springfield/MoDOT TMC)	X	X		On Going
CCTV	X	X		On Going
Computer Aided Dispatch (CAD) Interface		X	July-04	December-04
Dynamic Message Signs (DMS)	X	X		On Going
Road Weather Information Systems (RWIS)		X		
Real Time System Detection (VOS Data)		X	July-04	December-05
Real Time System Detection (Vol Data) Branson TRIP	X	X		
Highway Advisory Radio	X	X		On Going
<b>ARTERIAL MANAGEMENT</b>				
Operations Center (Springfield/MoDOT TMC)	X	X		On Going
Interconnected Signals	X			On Going
Pre-Emption (Rail and Emergency)	X	X		On Going
CCTV	X	X		On Going
Computer Aided Dispatch (CAD) Interface		X	July-04	December-04
Real Time System Detection (VOS Data)		X	July-04	December-05
Real Time System Detection (Vol Data) Branson TRIP	X	X		
Dynamic Message Signs (DMS)		X	July-04	December-05
Road Weather Information Systems (RWIS)		X		
Highway Advisory Radio	X	X		On Going
<b>INCIDENT MANAGEMENT</b>				
Incident Management	X	X		On Going
IM Database/Response Plans		X	July-04	December-05
Computer Aided Dispatch (CAD) Interface		X	July-04	December-04
<b>TRANSIT</b>				
On-Board CCTV (Recorded/Not Transmitted)	X			
Electronic Fare Collection	X			
<b>ADVANCE TRAVELER INFORMATION SYSTEMS</b>				
ATIS/ 511		X		
Website	X	X		On Going
Video Broadcast to Media	X	X		On Going
Highway Advisory Radio	X	X		On Going
<b>PARKING SYSTEMS</b>				
Parking Structure Management	X	X		On Going
<b>OTHER MISCELLANEOUS</b>				
Statewide work zone program	X	X		On Going