



Arkansas State Highway and Transportation Department
Regional ITS Architectures and Deployment Plans

Bi-State Region



Regional ITS Deployment Plan

Prepared by:



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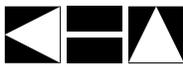


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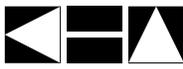


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LIST OF ACRONYMS

AD	Archived Data
ADA	Americans with Disabilities Act
AHTD	Arkansas State Highway and Transportation Department
AMBER	America's Missing: Broadcast Emergency Response
APTS	Advanced Public Transportation Systems
ATIS	Advanced Travel Information System
ATMS	Advanced Traffic Management System
AVL	Automated Vehicle Location
CAD	Computer Aided Dispatch
CCTV	Closed-Circuit Television
CVISN	Commercial Vehicle Information Systems and Networks
CVO	Commercial Vehicle Operations
DMS	Dynamic Message Sign
EM	Emergency Management
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HAR	Highway Advisory Radio
HAZMAT	Hazardous Materials
HRI	Highway Rail Intersections
ITS	Intelligent Transportation System
MC	Maintenance and Construction
MDT	Mobile Data Terminal
MPO	Metropolitan Planning Organization
ODOT	Oklahoma Department of Transportation
TMC	Transportation Management Center
TOC	Traffic Operations Center
VoIP	Voice over Internet Protocol

1. INTRODUCTION

1.1 Project Overview

The Bi-State Region has developed a Regional Intelligent Transportation System (ITS) Architecture under the direction of the Arkansas State Highway and Transportation Department (AHTD) with support from the Bi-State Metropolitan Planning Organization (MPO). ITS architectures provide a framework for implementing ITS projects, encourage interoperability and resource sharing among agencies, identify applicable standards to apply to projects, and allow for cohesive long-range planning among regional stakeholders. The Regional ITS Architecture focuses on the functionality that ITS could provide in the Region as well as how those functions would be operated by agencies in and around the Bi-State Region. The Regional ITS Architecture also satisfies an important requirement from the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) regarding transportation and funding. A FHWA Final Rule and a FTA Final Policy issued in 2001 requires that regions develop an ITS architecture and show how ITS projects conform to that regional ITS architecture in order to receive federal funding.

The ITS Deployment Plan, while not required by the FHWA and FTA, is a useful tool for Regions to identify specific projects that can be deployed in order to implement the architecture. The ITS Deployment Plan builds on the architecture by outlining specific ITS project recommendations and strategies for the Region, and identifying deployment timeframes so that the recommended projects and strategies can be implemented over time.

The ITS Deployment Plan also ties each project back to the architecture by identifying the market packages that correspond to each project. If projects are identified that do not correspond to market packages, the ITS architecture can be revised easily while still in draft format. The resulting ITS deployment projects from this effort should be clearly supported by the ITS architecture.

The Bi-State Regional ITS Architecture and the ITS Deployment Plan were both developed with significant input from local, state, and federal officials. A series of four workshops were held to solicit input from stakeholders and ensure that the plans reflected the unique needs of the Region. Copies of the draft reports were sent to all stakeholders and the project website allowed stakeholders to submit comments directly to the project team. The Regional ITS Architecture and Deployment Plan developed reflect an accurate snapshot of existing ITS deployments and future ITS plans in the Region. Needs and priorities of the Region will change over time and, in order to remain effective, this plan should be periodically reviewed and updated.

1.2 Document Overview

The Bi-State Regional ITS Deployment Plan is organized into four key sections:

Section 1 – Introduction

This section provides an overview of the National ITS Architecture requirements, the Bi-State Regional ITS Deployment Plan, and the key features and stakeholders in the Bi-State Region.

Section 2 – Application of Regional ITS Architecture Market Packages

A summary of the market packages selected and prioritized for the Region is provided in this section. Each market package is described and a listing of projects that support implementation of the services contained in the market package is provided.

Section 3 – Project Recommendations

This section contains project recommendations to address stakeholder needs and goals for ITS implementation in the Region. Each project includes a description of the project, responsible agency, an opinion of probable cost, whether or not funding has been identified, and a listing of market packages that are associated with the project.

Section 4 – Maintaining the Regional ITS Deployment Plan

A brief description of the maintenance procedure for the Regional ITS Deployment Plan is provided in this section.

1.3 The Bi-State Region

1.3.1 Region Overview

The Bi-State Region is defined by the boundaries of the Bi-State MPO. The Region encompasses 545 square miles in western Arkansas and eastern Oklahoma. It includes southwestern Crawford County and northwestern Sebastian County in Arkansas, and eastern Sequoyah County and northeastern LeFlore County in Oklahoma. The two major cities in the area are Fort Smith and Van Buren, which are both situated in Arkansas on opposite sides of the Arkansas River. The population of the Bi-State MPO area is 154,640 according to the 2000 Census.

The Bi-State Region is served by numerous State and Federal highways. Primary roadway facilities include I-40, I-540, US 59, US 64, US 71, and US 271. I-40 and I-540 are divided interstate highways in the Region; I-40 runs east-west and I-540 runs north-south. Their effective operation is critical to the movement of goods and people throughout the States of Arkansas and Oklahoma, as well the United States.

I-40 extends from the Atlantic Ocean in North Carolina to its termination at I-15 in California. Construction and incidents along I-40 can have a severe impact on commercial vehicle traffic and motorists traveling through the Region on this significant cross-country facility.

I-540 serves several rapidly growing communities in Northwest Arkansas. Some of the traffic along the roadway is daily commuter traffic between the Bi-State Region and the cities in Northwest Arkansas. This travel pattern is anticipated to continue to grow in coming years.

1.3.2 Stakeholders

Due to the fact that ITS often transcends traditional transportation infrastructure, it is important to involve non-traditional stakeholders in the ITS Architecture and Deployment Plan development. Input from these stakeholders, both public and private, is a critical part of defining the interfaces, integration needs, and overall vision for ITS in a region.



The following stakeholder agencies have participated in the Bi-State Region project workshops or provided input to the study team:

- AHTD Central Office;
- AHTD District Four;
- AHTD Highway Police;
- Arkansas State Police;
- Bi-State MPO;
- City of Fort Smith;
- City of Greenwood;
- City of Van Buren;
- Crawford County;
- FHWA Arkansas Division;
- Fort Smith Advertising and Promotion Commission;
- Fort Smith Airport;
- Fort Smith Transit;
- KIBOIS Community Action Foundation;
- Oklahoma Department of Transportation (ODOT);
- Sebastian County;
- Van Buren Advertising and Promotion Commission; and
- Western Arkansas Planning and Development District.

A more detailed list of stakeholders, including the individuals representing each agency, is provided in the ITS Architecture report.

2. REGIONAL ITS ARCHITECTURE MARKET PACKAGE IMPLEMENTATION

Of the 85 market packages available in Version 5.1 of the National ITS Architecture, 39 were selected and customized for deployment in the Bi-State Region. The market packages outline the functions that stakeholders envision ITS to perform in coming years. The Deployment Plan builds on those market packages through the development of project concepts to implement in the Region.

2.1 Market Package Prioritization

Stakeholders were asked to prioritize the market packages into high, medium, and low priorities based on regional needs, feasibility, likelihood of deployment, and overall contribution of the market package to the goals and vision for ITS functionality in the Region. A summary of these prioritized market packages is shown in **Table 1**. More detail on the ITS Market Packages is provided in the ITS Architecture report.

Table 1 – Bi-State Market Package Prioritization by Functional Area

High Priority Market Packages	Medium Priority Market Packages	Low Priority Market Packages
<i>Travel and Traffic Management</i>		
ATMS01 Network Surveillance ATMS03 Surface Street Control ATMS06 Traffic Information Dissemination ATMS08 Traffic Incident Management System	ATMS07 Regional Traffic Control ATMS13 Standard Railroad Grade Crossing	ATMS04 Freeway Control ATMS15 Railroad Operations Coordination
<i>Emergency Management</i>		
EM01 Emergency Call Taking and Dispatch EM02 Emergency Routing EM05 Transportation Infrastructure Protection EM06 Wide Area Alert		EM09 Evacuation and Reentry Management EM10 Disaster Traveler Information
<i>Maintenance and Construction Management</i>		
MC03 Road Weather Data Collection MC04 Weather Information Processing and Distribution MC08 Work Zone Management MC10 Maintenance and Construction Activity Coordination	MC07 Roadway Maintenance and Construction	MC01 Maintenance and Construction Vehicle and Equipment Tracking MC02 Maintenance and Construction Vehicle Maintenance MC06 Winter Maintenance MC09 Work Zone Safety Monitoring

Table 1 – Bi-State Market Package Prioritization by Functional Area (continued)

High Priority Market Packages	Medium Priority Market Packages	Low Priority Market Packages
<i>Public Transportation Management</i>		
APTS2 Transit Fixed Route Operations APTS3 Demand Response Transit Operations APTS4 Transit Passenger and Fare Management APTS7 Multi-modal Coordination APTS8 Transit Traveler Information	APTS1 Transit Vehicle Tracking APTS5 Transit Security	APTS6 Transit Maintenance Management
<i>Commercial Vehicle Operations</i>		
	CVO10 HAZMAT Management	CVO04 CV Administrative Processes CVO06 Weigh-in-Motion
<i>Traveler Information</i>		
ATIS1 Broadcast Traveler Information ATIS2 Interactive Traveler Information	ATIS5 ISP Based Route Coordination	
<i>Archived Data Management</i>		
	AD1 ITS Data Mart AD2 ITS Data Warehouse	

The market package prioritization was a primary factor in developing recommendations for ITS deployment and integration projects in the Bi-State Region. These priorities identified the key ITS services that are desired by stakeholders in the Region, as well as the interfaces that need to be established to provide integrated functionality and establish communication between elements. It is important to note that the high, medium, and low prioritization does not necessarily correspond to any specific time frame (such as five, ten, or twenty year deployment horizon). For example, a market package can be a high priority, but because of funding or prerequisite project requirements, it might not be feasible for deployment for several years. Maturity and availability of technology were also considered in prioritizing the market packages. Another consideration included whether or not the market package was better suited for private deployment and operations rather than public sector deployment.

2.2 Market Packages and Supporting Projects

In order to implement the ITS market package services in the Bi-State Region, each market package was reviewed to determine what projects should be deployed in order to provide the desired services of that market package. Stakeholders provided a great deal of feedback on these projects at an ITS Deployment Plan Workshop. While the timeframe of the Deployment Plan was as far out as twenty-years, stakeholders generally focused on shorter term projects that were more likely to be funded when identifying projects.



It should be noted that not every market package has an associated ITS project. Several market packages were identified as being important to the Region; however, at this time there are no projects that stakeholders felt were feasible enough to document in the ITS Deployment Plan. In the future, it is likely that additional projects will be added to the ITS Deployment Plan to implement these market packages.

The market packages in the following subsections are organized by service area in the order they appear in the National ITS Architecture. Each market package includes:

- A brief definition of the market package (which has been modified from the National ITS Architecture definition);
- Stakeholder priority for the market package; and
- Recommended projects that will address some or all of the services that are contained in the market package.

2.2.1 Traffic Management Service Area

The following market packages and related projects implement the traffic management service area functions. These traffic management service areas represent some of the most commonly deployed projects, such as closed-circuit television (CCTV) cameras, dynamic message signs (DMS), traffic operations centers (TOCs), and traffic signal systems. It is expected that many of the market packages in this service area will be deployed prior to market packages in other service areas.

Table 2 – Traffic Management Market Packages and Projects

Network Surveillance (ATMS01)	High Priority
Includes traffic detectors, CCTV cameras, other surveillance equipment, supporting field equipment, and fixed point to point communications to transmit the collected data back to a traffic management center.	
<p>Recommended Projects</p> <ul style="list-style-type: none"> ▪ AHTD CCTV Cameras on I-40 and I-540 ▪ City of Fort Smith Transportation Management Center Phase 2 	

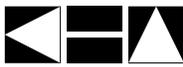


Table 2 – Traffic Management Market Packages and Projects (continued)

Surface Street Control (ATMS03)	High Priority
<p>Provides the central control and monitoring equipment, communication links, and signal control equipment that support local street and/or arterial traffic management. This market package is consistent with typical urban traffic signal control systems.</p>	
<p>Recommended Projects</p> <ul style="list-style-type: none"> ▪ City of Fort Smith Signal Coordination and Upgrades ▪ City of Fort Smith Transportation Management Center Phase 1 ▪ City of Fort Smith Transportation Management Center Phase 2 ▪ City of Greenwood Emergency Vehicle Signal Preemption ▪ City of Greenwood School Zone Flasher Pager Control System ▪ City of Greenwood Signal Coordination and Upgrades ▪ City of Greenwood TOC ▪ City of Van Buren Emergency Vehicle Signal Preemption ▪ City of Van Buren School Zone Flasher Pager Control System ▪ City of Van Buren TOC ▪ City of Van Buren Traffic Signal System Optimization and Staff Training 	
Freeway Control (ATMS04)	Low Priority
<p>Provides the communications and roadside equipment to support ramp control, lane controls, and interchange control for freeways. This market package is consistent with typical urban traffic freeway control systems. It also includes the capability to utilize surveillance equipment for the detection of incidents.</p>	
<p>Recommended Projects</p> <p>No projects have been identified at this time</p>	
Traffic Information Dissemination (ATMS06)	High Priority
<p>Provides driver information using roadway equipment such as dynamic message signs or highway advisory radio (HAR). Information can include traffic and road conditions, closure and detour information, incident information, emergency alerts and driver advisories.</p>	
<p>Recommended Projects</p> <ul style="list-style-type: none"> ▪ AHTD DMS on I-40 and I-540 ▪ City of Fort Smith Portable DMS ▪ Fort Smith Airport HAR ▪ Regional Portable DMS Fleet ▪ Fort Smith Airport Traveler Information Kiosk 	

Table 2 – Traffic Management Market Packages and Projects (continued)

Regional Traffic Control (ATMS07)	Medium Priority
Facilitates 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.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ AHTD/ODOT Communications Connection ▪ Regional TMC 	

Traffic Incident Management System (ATMS08)	High Priority
Manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. This market package includes incident detection capabilities and coordination with other agencies. It supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ AHTD CCTV Cameras on I-40 and I-540 ▪ AHTD DMS on I-40 and I-540 ▪ AHTD/ODOT Communications Connection ▪ City of Fort Smith Portable DMS ▪ City of Fort Smith Transportation Management Center Phase 1 ▪ City of Fort Smith Transportation Management Center Phase 2 ▪ Regional Portable DMS Fleet ▪ Regional TMC 	

Standard Railroad Grade Crossing (ATMS13)	Medium Priority
Manages highway traffic at highway-rail intersections (HRIs) where rail operations speeds are less than 80 mph.	
Recommended Projects	
No projects have been identified at this time	

Railroad Operations Coordination (ATMS15)	Low Priority
Provides an additional level of strategic coordination between freight rail operations and traffic management centers. Could include train schedules, maintenance schedules or any other anticipated HRI closures.	
Recommended Projects	
No projects have been identified at this time	

2.2.2 Emergency Management Service Area

The following market packages and related projects implement ITS functions that support emergency management activities. These market packages are important for incident response, coordination of the emergency management and transportation systems, and protection of the transportation infrastructure.

Table 3 – Emergency Management Market Packages and Projects

Emergency Call-Taking and Dispatch (EM01)	High Priority
Provides basic public safety call-taking and dispatch services. Includes emergency vehicle equipment, equipment used to receive and route emergency calls, wireless communications, and coordination between emergency management agencies.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ City of Fort Smith Fire and Police Department AVL and MDTs ▪ City of Van Buren Emergency Services CAD Upgrade ▪ City of Van Buren Fire and Police Department AVL and MDTs 	
Emergency Routing (EM02)	High Priority
Supports automated vehicle location and dynamic routing of emergency vehicles. Traffic information, road conditions and suggested routing information are provided to enhance emergency vehicle routing. Includes signal preemption and priority applications.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ City of Van Buren Fire and Police Department AVL and MDTs ▪ City of Fort Smith Fire and Police Department AVL and MDTs ▪ City of Greenwood Emergency Vehicle Signal Preemption ▪ City of Van Buren Emergency Vehicle Signal Preemption 	
Transportation Infrastructure Protection (EM05)	High Priority
Includes the monitoring of transportation infrastructure (e.g. bridges, tunnels and management centers) for potential threats using sensors, surveillance equipment, and barriers and safeguard systems to preclude an incident, control access during and after an incident, or to mitigate the impact of an incident. Threats can be acts of nature, terrorist attacks, or other incidents causing damage to the infrastructure.	
Recommended Projects	
No projects identified at this time	
Wide Area Alert (EM06)	High Priority
Uses ITS driver and traveler information systems to alert the public in emergency situations such as child abductions, severe weather, civil emergencies, or other situations that pose a threat to life and property.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ AHTD DMS on I-40 and I-540 	

Table 3 – Emergency Management Market Packages and Projects (continued)

Evacuation and Reentry Management (EM09)	Low Priority
Supports evacuation of the general public from a disaster area and manages subsequent reentry to the disaster area. This market package supports both anticipated, well-planned, and orderly evacuations such as for a hurricane, as well as sudden evacuations with little or no time for preparation or public warning such as a terrorist act. Employs a number of strategies to maximize capacity along an evacuation route including coordination with transit.	
Recommended Projects	
No projects identified at this time	

Disaster Traveler Information (EM10)	Low Priority
Uses ITS to provide disaster-related traveler information to the general public, including evacuation and reentry information and other information concerning the operation of the transportation system during a disaster.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ AHTD DMS on I-40 and I-540 ▪ Arkansas 511 Implementation 	

2.2.3 *Maintenance and Construction Management Service Area*

The following market packages and related projects implement maintenance and construction management ITS functions. Many of the maintenance and construction market packages address ITS services for the Bi-State Region where stakeholders did not identify specific projects for implementation. While stakeholders were interested in these market package services, implementation of the services will likely not occur until sometime in the distant future. Projects to provide flood detection and traveler information in work zones were the most common projects identified at the time the plan was developed.

Table 4 – Maintenance and Construction Management Market Packages and Projects

Maintenance and Construction Vehicle and Equipment Tracking (MC01)	Low Priority
Tracks the location of maintenance and construction vehicles and other equipment to ascertain the progress of their activities.	
Recommended Projects	
No projects identified at this time	

**Table 4 – Maintenance and Construction Management Market Packages and Projects
(continued)**

Maintenance and Construction Vehicle Maintenance (MC02)	Low Priority
Performs vehicle maintenance scheduling and manages both routine and corrective maintenance activities. Includes on-board sensors capable of automatically performing diagnostics.	
Recommended Projects	
No projects identified at this time	

Road Weather Data Collection (MC03)	High Priority
Collects current road weather conditions using data collected from environmental sensors deployed on and about the roadway.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ City of Greenwood Flood Detection Stations 	

Weather Information Processing and Distribution (MC04)	High Priority
Processes and distributes the environmental information collected from the Road Weather Data Collection market package. This market package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so system operators can make decisions on corrective actions to take.	
Recommended Projects	
No projects identified at this time	

Winter Maintenance (MC06)	Low Priority
Supports winter road maintenance. Monitors environmental conditions and weather forecasts and uses the information to schedule winter maintenance activities.	
Recommended Projects	
No projects identified at this time	

Roadway Maintenance and Construction (MC07)	Medium Priority
Supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way. Environmental conditions information is also received from various weather sources to aid in scheduling maintenance and construction activities.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ City of Van Buren Maintenance GIS Database 	



**Table 4 – Maintenance and Construction Management Market Packages and Projects
(continued)**

Work Zone Management (MC08)	High Priority
Directs activity in work zones, controlling traffic through portable dynamic message signs and informing other groups of activity for better coordination management. Also provides speed and delay information to motorists prior to the work zone.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ City of Fort Smith Portable DMS ▪ Regional Portable DMS Fleet 	

Work Zone Safety Monitoring (MC09)	Low Priority
Includes systems that improve work crew safety and reduce collisions between the motoring public and maintenance and construction vehicles. Detects vehicle intrusions in work zones and warns workers and drivers of safety hazards when encroachment occurs.	
Recommended Projects	
No projects identified at this time	

Maintenance and Construction Activity Coordination (MC10)	High Priority
Supports the dissemination of maintenance and construction activity information to centers that can utilize it as part of their operations. (i.e., traffic management, transit, emergency management)	
Recommended Projects	
No projects identified at this time	

2.2.4 Public Transportation Management Service Area

The following market packages and related projects implement public transportation management ITS functions. Public transportation projects for Fort Smith Transit were identified for a number of market packages. Many of these market packages were considered high priority and will likely be implemented in the near future.

Table 5 – Public Transportation Management Market Packages and Projects

Transit Vehicle Tracking (APTS1)	Medium Priority
Monitors current transit vehicle location using an automated vehicle location system. Location data may be used to determine real time schedule adherence and update the transit system's schedule in real time.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ Fort Smith Transit AVL ▪ Greenwood Public Schools AVL on School Buses 	

Transit Fixed-Route Operations (APTS2)	High Priority
Performs vehicle routing and scheduling, as well as operator assignment and system monitoring for fixed-route and flexible-route transit services.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ City of Fort Smith Transportation Management Center Phase 1 ▪ City of Fort Smith Transportation Management Center Phase 2 ▪ Regional Transit Coordination System ▪ Statewide Transit Coordination System 	

Demand Response Transit Operations (APTS3)	High Priority
Performs vehicle routing and scheduling, as well as operator assignment and system monitoring for demand responsive transit services.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ City of Fort Smith Transportation Management Center Phase 1 ▪ City of Fort Smith Transportation Management Center Phase 2 ▪ Regional Transit Coordination System ▪ Statewide Transit Coordination System 	

Transit Passenger and Fare Management (APTS4)	High Priority
Manages passenger loading data and fare payments on transit vehicles using electronic means.	
Recommended Projects	
No projects identified at this time	



**Table 5 – Public Transportation Management Market Packages and Projects
(continued)**

Transit Security (APTS5)	Medium Priority
Provides for the physical security of transit passengers and transit vehicle operators. Includes on-board security cameras and panic buttons.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ Fort Smith Transit Intermodal Terminal Video Surveillance ▪ Fort Smith Transit Vehicle Video Surveillance 	

Transit Maintenance Management (APTS6)	Low Priority
Supports automatic transit maintenance scheduling and monitoring for both routine and corrective maintenance.	
Recommended Projects	
No projects identified at this time	

Multi-Modal Coordination (APTS7)	High Priority
Establishes two way communications between multiple transit and traffic agencies to improve service coordination.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ City of Fort Smith Transportation Management Center Phase 1 ▪ City of Fort Smith Transportation Management Center Phase 2 ▪ Regional Transit Coordination System ▪ Statewide Transit Coordination System 	

Transit Traveler Information (APTS8)	High Priority
Provides transit users at transit stops and on board transit vehicles with ready access to transit information. Services include stop annunciation, imminent arrival signs, and real-time transit schedule displays. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this market package.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ Fort Smith Airport Traveler Information Kiosk ▪ Fort Smith Transit Audible Bus Stop Information ▪ Fort Smith Transit Traveler Information Kiosks ▪ Regional Transit Coordination System ▪ Statewide Transit Coordination System 	

2.2.5 Commercial Vehicle Operations Service Area

There were three market packages that were identified that related to commercial vehicle operations in the Region. Planning for commercial vehicle operations is also being done on a statewide level as part of the Commercial Vehicle Information Systems Network (CVISN) program. As part of this program projects are being developed on a statewide basis rather than a regional basis. Although several market packages were identified by stakeholders for local deployment, no projects were currently identified for implementation of these market packages.

Table 6 – Commercial Vehicle Operations Market Packages and Projects

CV Administrative Processes (CVO04)	Low Priority
Provides for electronic application, processing, fee collection, issuance, and distribution of CVO credentials and tax filing.	
Recommended Projects	
No projects identified at this time	
Weigh-in-Motion (CVO06)	Low Priority
Provides for high speed weigh-in-motion with or without automated vehicle identification capabilities.	
Recommended Projects	
No projects identified at this time	
HAZMAT Management (CVO10)	Medium Priority
Integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of hazardous materials (HAZMAT) material and incidents.	
Recommended Projects	
No projects identified at this time	

2.2.6 Traveler Information Service Area

The following market packages and related projects implement traveler information ITS functions. Traveler information service area projects address market packages that broadcast traveler information over a wide area. A possible future 511 traveler information phone number as well as improved media liaison and coordination were identified as projects to facilitate broadcast traveler information. Traveler information provided at specific locations on the roadway, such as DMS, is addressed in the ATMS06 – Traffic Information Dissemination market package in Section 2.2.1.

Table 7 – Traveler Information Market Packages and Projects

Broadcast Traveler Information (ATIS1)	High Priority
Collects traffic conditions, advisories, general public transportation information, toll and parking information, incident information, roadway maintenance and construction information, and air quality and weather information and broadly disseminates this information through existing infrastructures (radio, cell phones, etc.).	
Recommended Projects	
<ul style="list-style-type: none"> ▪ Arkansas 511 Implementation ▪ Media Liaison and Coordination 	

Interactive Traveler Information (ATIS2)	High Priority
Provides tailored information in response to a traveler request. The traveler can obtain current information regarding traffic conditions, roadway maintenance and construction, transit services, ride share/ride match, parking management, detours and pricing information.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ Arkansas 511 Implementation 	

ISP Based Route Guidance (ATIS5)	Medium Priority
Offers the user pre-trip route planning and turn-by-turn route guidance services. Routes may be based on static or real time network conditions.	
Recommended Projects	
No projects identified at this time	

2.2.7 Archived Data Management Service Area

The following market packages and related projects implement archived data management ITS functions. Data collected through ITS deployments can be housed in several different formats. The market packages selected by stakeholders will allow data for a specific agency to be housed by that agency, or for data from multiple agencies throughout the region to be housed together.

Table 8 – Archived Data Management Market Packages and Projects

ITS Data Mart (AD1)	Medium Priority
Provides a focused archive that houses data collected and owned by a single agency or other organization. Focused archive typically covers a single transportation mode and one jurisdiction.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ Fort Smith Transit Data Mart 	

ITS Data Warehouse (AD2)	Medium Priority
Includes all the data collection and management capabilities of the ITS Data Mart. Adds the functionality to allow collection of data from multiple agencies and data sources across modal and jurisdictional boundaries.	
Recommended Projects	
<ul style="list-style-type: none"> ▪ Bi-State MPO Data Warehouse 	

3. PROJECT RECOMMENDATIONS

In order to achieve the vision of the Regional ITS Architecture, a Region must deploy carefully developed projects that provide the functionality and interoperability identified in the architecture. A key step toward that vision is the development of an ITS Deployment Plan that identifies specific projects, timeframes, and responsible agencies.

Input from all stakeholders is required in order for the stakeholders to have ownership of the ITS Deployment Plan and also to be sure that the plan has realistically identified projects and timeframes for the Region. Cost is another important factor—cost can vary a great deal for many ITS elements, depending on the level of deployment, maturity of the technology, type of communications, etc. For example, freeway network surveillance could be adequately achieved for one Region by the deployment of still frame CCTV cameras only at freeway interchanges. In another Region, there may be a desire for full motion cameras deployed at one mile intervals to provide complete coverage of the freeway. The infrastructure and telecommunications costs for these two projects would vary a great deal, yet either one could be suitable for a particular Region.

In order to achieve input from stakeholders, a workshop was held in the Bi-State Region on September 22, 2005 to discuss potential projects. Each project recommended for the Regional ITS Deployment Plan was discussed, and consensus was reached by the stakeholders on the project description and the timeframe for implementation.

In the following sections, projects are categorized into functional areas: Travel and Traffic Management, Emergency Management, Maintenance and Construction Management, Public Transportation Management, Archived Data Management and Projects of Statewide Significance. For each functional area, stakeholders grouped projects into timeframes for deployment based on priority, dependence on other projects, technology, and feasibility. The timeframes have been loosely defined as 0-5 years, 5-10 years, and 10-20 years for short-term, mid-term, and long-term respectively. Actual deployment timeframes will be dependent on inclusion in the TIP and identification of funding sources.

For each project, the tables include a project description, responsible agency, opinion of probable cost, an indication as to whether funding has been identified, and the applicable market packages in the Bi-State Regional ITS Architecture. In addition to the regional and statewide projects identified in Section 3.1 and 3.2, communications needs are discussed in Section 3.3.

3.1 Regional Projects

Regional projects are identified in **Table 9** through **Table 13**. The tables are broken out as follows:

- **Table 9** – Travel and Traffic Management Project Recommendations;
- **Table 10** – Emergency Management Project Recommendations;
- **Table 11** – Maintenance and Construction Management Project Recommendations;
- **Table 12** – Public Transportation Recommendations; and
- **Table 13** – Archived Data Management Project Recommendations.



Table 9 – Travel and Traffic Management Project Recommendations

Program Area/Project	Description	Responsible Agency ¹	Opinion of Probable Cost ²	Funding Identified	Applicable Market Packages
Short-Term Travel and Traffic Management Projects					
AHTD DMS on I-40 and I-540	Implement dynamic message signs (DMS) on I-40 and I-540 for traffic information dissemination. This project will include a minimum of four DMS already funded as part of the America's Missing: Broadcast Emergency Response (AMBER) Alert program and additional DMS as needed. Cost for this project represents an average cost per DMS including sign, pole, and communications.	AHTD	\$150,000/sign	Yes	ATMS06 ATMS08 EM06 EM10
City of Fort Smith Transportation Management Center Phase 1	Establish a Transportation Management Center (TMC) for Fort Smith. This project includes the collocation of the City of Fort Smith Traffic Department and the Fort Smith Transit Dispatch. Phase 1 deployment will focus on traffic signal system operations and transit dispatch. Cost for this project represents a range for a medium size TMC and includes potential costs for hardware, software, and facility upgrades to incorporate the TMC into available space in an existing building.	City of Fort Smith, Fort Smith Transit	\$200,000 - \$500,000	No	ATMS03 ATMS08 APTS2 APTS3 APTS7
City of Fort Smith Signal Coordination and Upgrades	Ongoing signal coordination and upgrades including the implementation of video detection on traffic signals in the City of Fort Smith. Cost for this project represents an average cost per intersection for upgrading and coordinating an existing signalized intersection. The City of Fort Smith currently operates 136 signals.	City of Fort Smith	\$20,000/intersection	No	ATMS03
City of Van Buren TOC	Implement a Traffic Operations Center (TOC) for the City of Van Buren to control signal system operations from a central location. Cost for this project represents a range for a small size TMC and includes potential costs for hardware, software, and facility upgrades to incorporate the TMC into available space in an existing building.	City of Van Buren	\$100,000 - \$300,000	No	ATMS03



Table 9 – Travel and Traffic Management Project Recommendations (continued)

Program Area/Project	Description	Responsible Agency ¹	Opinion of Probable Cost ²	Funding Identified	Applicable Market Packages
Short-Term Travel and Traffic Management Projects (continued)					
City of Van Buren Traffic Signal System Optimization and Staff Training	Re-time and coordinate signals in the City of Van Buren to optimize the flow of traffic. This project also includes training for City Traffic Department staff on signal timing and coordination. Cost for this project represents an average cost per intersection for upgrading and coordinating an existing signalized intersection. The City of Van Buren currently operates 15 signals and plans to add 5 more signals by 2007.	City of Van Buren	\$20,000/ intersection	No	ATMS03
City of Greenwood TOC	Implement a TOC for the City of Greenwood to control signal system operations from a central location. Cost for this project represents a range for a small size TMC and includes potential costs for hardware, software, and facility upgrades to incorporate the TMC into available space in an existing building.	City of Greenwood	\$100,000 - \$300,000	No	ATMS03
City of Greenwood Signal Coordination and Upgrades	Ongoing signal coordination and upgrades including the implementation of video detection on traffic signals in the City of Greenwood. Cost for this project represents an average cost per intersection for upgrading and coordinating an existing signalized intersection. The City of Greenwood currently operates 3 signals and plans to add 2 additional signals by 2007.	City of Greenwood	\$20,000/ intersection	No	ATMS03
Regional Communications Master Plan	Develop a Communications Master Plan for the Bi-State Region. The project will examine current and future regional communication needs to support ITS implementation. The Master Plan and the communications implementation projects that will implement the plan will be the foundation for ITS in the Region. To achieve the connections for coordination and data sharing that are outlined in the architecture, an effective communications system is essential.	AHTD, City of Fort Smith, City of Van Buren, City of Greenwood	\$100,000 - \$200,000	No	All Market Packages ³
Regional Communications Implementation Phase 1	Phase 1 communications infrastructure implementation as recommended by the Regional Communications Master Plan to support ITS deployment. Cost for this project will be determined by the Regional Communications Master Plan.	AHTD, City of Fort Smith, City of Van Buren, City of Greenwood	To Be Determined	No	All Market Packages ³



Table 9 – Travel and Traffic Management Project Recommendations (continued)

Program Area/Project	Description	Responsible Agency ¹	Opinion of Probable Cost ²	Funding Identified	Applicable Market Packages
Mid-Term Travel and Traffic Management Projects					
AHTD CCTV Cameras on I-40 and I-540	Implement closed circuit television (CCTV) cameras on key sections of I-40 and I-540. CCTV cameras can be used to monitor traffic conditions and to aid in incident management. Video feeds could possibly be shared with emergency management agencies to facilitate emergency response. Cost for this project represents an average cost per site including camera, pole, and communications at camera.	AHTD	\$30,000/site	No	ATMS01 ATMS08
City of Fort Smith Transportation Management Center Phase 2	Expand the capabilities of the City of Fort Smith Transportation Management Center possibly to include the ability to view video images from AHTD. Cost for this project represents a typical range for a TMC to upgrade hardware and software.	City of Fort Smith, Fort Smith Transit	\$100,000 - \$200,000	No	ATMS01 ATMS03 ATMS08 APTS2 APTS3 APTS7
City of Van Buren School Zone Flasher Pager Control System	Implement a pager system for programming of school zone flasher signs in the City of Van Buren. A pager based system allows for modifications to the flasher timings to accommodate special events such as an athletic event or an early dismissal. Cost for this project represents an average range.	City of Van Buren	\$5,000 - \$10,000/site	No	ATMS03
City of Greenwood School Zone Flasher Pager Control System	Implement a pager system for programming of school zone flasher signs in the City of Greenwood. A pager based system allows for modifications to the flasher timings to accommodate special events such as an athletic event or an early dismissal. Cost for this project represents an average range.	City of Greenwood	\$5,000 - \$10,000/site	No	ATMS03
Fort Smith Airport HAR	Implement highway advisory radio (HAR) for the dissemination of airport information to travelers as they exit or enter the airport. Cost for this project represents a range for a HAR site that includes a roadside transmitter and software for recording messages.	Fort Smith Airport	\$20,000 - \$40,000/site	No	ATMS06



Table 9 – Travel and Traffic Management Project Recommendations (continued)

Program Area/Project	Description	Responsible Agency ¹	Opinion of Probable Cost ²	Funding Identified	Applicable Market Packages
Mid-Term Travel and Traffic Management Projects (continued)					
Fort Smith Airport Traveler Information Kiosk	Install a traveler information kiosk in the Fort Smith Airport to provide travelers with up to date roadway condition information as well as information on local transit options. Cost represents a cost for a typical kiosk with commercial off the shelf software. Additional software development would increase the cost.	Fort Smith Airport	\$20,000/kiosk	No	ATMS06 APTS8
Regional Communications Implementation Phase 2	Phase 2 communications infrastructure implementation as recommended by the Regional Communications Master Plan to support ITS deployment. Cost for this project will be determined by the Regional Communications Master Plan and Phase 1 of the Regional Communications Implementation.	AHTD, City of Fort Smith, City of Van Buren, City of Greenwood	To Be Determined	No	All Market Packages ³
Media Liaison and Coordination	Develop agreements and enhanced coordination with local media to improve information sharing and dissemination. There is no cost associated with this project. Should the media desire to gather data, such as camera feeds, from transportation agencies in the Region, it is expected that the media would be responsible for any costs.	AHTD/City of Fort Smith/City of Van Buren/City of Greenwood/Municipalities	N/A	N/A	ATIS1
Long Term Travel and Traffic Management Projects					
Regional TMC	Establish a Regional TMC, either physically or virtually, that would involve all traffic and emergency management agencies in the Bi-State Region to increase the level of coordination between agencies. Cost for this project would vary greatly depending on the timeframe and type (physical or virtual) of deployment.	City of Fort Smith/City of Van Buren/City of Greenwood/Municipalities	To Be Determined	No	ATMS07 ATMS08

¹Agency listed is responsible for implementation, operations, and maintenance unless otherwise noted.

²The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.

³Supports all market packages, but is not specifically represented in any market package.



Table 10 – Emergency Management Project Recommendations

Program Area/Project	Description	Responsible Agency ¹	Opinion of Probable Cost ²	Funding Identified	Applicable Market Packages
Short-Term Emergency Management Projects					
City of Van Buren Emergency Services CAD Upgrade	Upgrade the computer aided dispatch (CAD) system for Van Buren Emergency Services to integrate Van Buren with the regionally interconnected CAD system. Cost for this project will vary greatly depending on the type of system and level of integration desired with current systems.	City of Van Buren	To Be Determined	No	EM01
Mid-Term Emergency Management Projects					
City of Van Buren Fire and Police Department AVL and MDTs	Implement automated vehicle location (AVL) and mobile data terminals (MDTs) for the City of Van Buren Fire and Police Departments. AVL will facilitate emergency vehicle dispatch and MDTs can be used to transmit a variety of data to field personnel such as routing information or incident details. Cost is provided for in-vehicle equipment. Additional cost for software may be incurred.	City of Van Buren	\$5,000/vehicle	No	EM01 EM02
City of Fort Smith Fire and Police Department AVL and MDTs	Implement AVL and MDTs for the City of Fort Smith Fire and Police Departments. AVL will facilitate emergency vehicle dispatch and MDTs can be used to transmit a variety of data to field personnel such as routing information or incident details. Cost is provided for in-vehicle equipment. Additional cost for software may be incurred.	City of Fort Smith	\$5,000/vehicle	No	EM01 EM02
City of Greenwood Emergency Vehicle Signal Preemption	Implement emergency vehicle signal preemption on City of Greenwood traffic signals for preemption by fire department vehicles. Signal preemption can reduce travel time for emergency responders to reach an incident and also increase safety for response personnel and motorists. It is recommended that preemption be considered during the traffic signal upgrades. A cost savings can be recognized by completing the projects concurrently or at least ensuring that preemption can easily be added at a later time.	City of Greenwood	\$6,000/ intersection \$1,500/vehicle	No	ATMS03 EM02



Table 10 – Emergency Management Project Recommendations (continued)

Program Area/Project	Description	Responsible Agency ¹	Opinion of Probable Cost ²	Funding Identified	Applicable Market Packages
Mid-Term Emergency Management Projects (continued)					
City of Van Buren Emergency Vehicle Signal Preemption	Implement emergency vehicle signal preemption on City of Van Buren traffic signals for preemption by fire department vehicles. Signal preemption can reduce travel time for emergency responders to reach an incident and also increase safety for response personnel and motorists. It is recommended that preemption be considered during the traffic signal upgrades. A cost savings can be recognized by completing the projects concurrently or at least ensuring that preemption can easily be added at a later time.	City of Van Buren	\$6,000/ intersection \$1,500/vehicle	No	ATMS03 EM02

¹Agency listed is responsible for implementation, operations, and maintenance unless otherwise noted.

²The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.



Table 11 – Maintenance and Construction Management Project Recommendations

Program Area/Project	Description	Responsible Agency ¹	Opinion of Probable Cost ²	Funding Identified	Applicable Market Packages
Short-Term Maintenance and Construction Management Projects					
City of Greenwood Flood Detection Stations	Implement flood detection stations at flood prone locations on roadways in the City of Greenwood. Flood sensors would notify the Greenwood Public Works Department so that crews can close flooded roadways. Cost for this project represents an average cost of \$10,000 per flood detection station. An additional cost of approximately \$10,000 may also be incurred if automated closure gates are added. The City is interested in implementing flood detection at 5-10 locations.	City of Greenwood	\$50,000-\$100,000	No	MC03
City of Fort Smith Portable DMS	Procure portable DMS for use in the City of Fort Smith during maintenance activities or for incident management. Cost represents an approximate cost per portable DMS.	City of Fort Smith	\$30,000/sign	No	ATMS06 ATMS08 MC08
Mid-Term Maintenance and Construction Management Projects					
City of Van Buren Maintenance GIS Database	Develop a GIS database for use by the City of Van Buren Street Department. The database will contain an inventory of city infrastructure and maintenance records such as bridge inspection dates and results. Cost for this project will vary depending on the level of detail and functionality of the software as well as the amount of development that is done in-house by the City.	City of Van Buren	To Be Determined	No	MC07
Regional Portable DMS Fleet	Establish a pool of portable DMS for the Bi-State Region that can be used by any of the municipalities within the MPO service area for construction, incident management, or special events. Cost represents an approximate cost for 8 portable DMS at approximately \$30,000 per sign.	Bi-State MPO	\$240,000	No	ATMS06 ATMS08 MC08

¹Agency listed is responsible for implementation, operations, and maintenance unless otherwise noted.

²The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.



Table 12 – Public Transportation Management Project Recommendations

Program Area/Project	Description	Responsible Agency ¹	Opinion of Probable Cost ²	Funding Identified	Applicable Market Packages
Short-Term Public Transportation Management Projects					
Fort Smith Transit Intermodal Terminal Video Surveillance	Install video surveillance equipment at the Fort Smith Transit Intermodal Terminal for security monitoring. Cost represents an average cost of \$1,000 per camera for 10 stationary cameras as well as communications and monitoring equipment. The actual cost of the system will depend on the camera technology selected and the monitoring equipment desired.	Fort Smith Transit	\$15,000-\$25,000	No	APTS5
Regional Transit Coordination System	Establish a coordination system for Fort Smith Transit and the River Valley Transit providers. This regional system would allow transit patrons traveling between transit agency service areas to coordinate their trip and arrange the necessary transfers. Cost for this project will vary depending on the level of detail and functionality of the system as well as the amount of development that is done in-house by the transit providers.	Fort Smith Transit, River Valley Transit Providers	To Be Determined	No	APTS2 APTS3 APTS7 APTS8
Mid-Term Public Transportation Management Projects					
Fort Smith Transit Vehicle Video Surveillance	Implement video surveillance on Fort Smith transit vehicles to improve patron and driver safety. The cost represents an average cost of \$5,000 per vehicle for the current fleet size of 19 vehicles.	Fort Smith Transit	\$95,000	No	APTS5
Fort Smith Transit Traveler Information Kiosks	Install transit information kiosks at the airport and future transit transfer station so that travelers can obtain travel information. Cost represents a cost of \$20,000 for a typical kiosk with commercial off the shelf software. Additional software development would increase the cost.	Fort Smith Transit	\$40,000	No	APTS8
Greenwood Public Schools AVL on School Buses	Implement AVL on Greenwood public school buses to track bus locations. If an incident were to occur on a bus, the dispatch center would immediately know exactly where the bus was located and could call for assistance. Cost represents an average cost per bus and includes some built in cost for software.	Greenwood Public Schools	\$5,000/bus	No	APTS1



Table 12 – Public Transportation Management Project Recommendations (continued)

Program Area/Project	Description	Responsible Agency ¹	Opinion of Probable Cost ²	Funding Identified	Applicable Market Packages
Long-Term Public Transportation Management Projects					
Fort Smith Transit AVL	Implement AVL on Fort Smith transit vehicles. AVL can be added to the fare collection system that the agency is currently using and would enable transit dispatch to track bus locations. This real-time information could be shared with transit patrons and also used in case of an incident. Cost represents an average cost of \$5,000 per vehicle and includes some built in cost for software for the existing fleet size of 19 vehicles.	Fort Smith Transit	\$95,000	No	APTS1
Fort Smith Transit Audible Bus Stop Information	This project would implement audible information at bus stops to improve Americans with Disabilities Act (ADA) accessibility. This could be a static system with schedule information, or use real-time information from the AVL to indicate anticipated bus arrival times. The cost for this project will vary widely depending on type of system that is implemented.	Fort Smith Transit	To Be Determined	No	APTS8

¹Agency listed is responsible for implementation, operations, and maintenance unless otherwise noted.

²The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.



Table 13 – Archived Data Management Project Recommendations

Program Area/Project	Description	Responsible Agency ¹	Opinion of Probable Cost ²	Funding Identified	Applicable Market Packages
Mid-Term Archived Data Management Projects					
Bi-State MPO Data Warehouse	Establish a data warehouse to archive data from cities and transit agencies in the Metropolitan Planning Organization (MPO) service area for use in regional transportation planning. Cost for this project represents an average range for developing a data warehouse system. Cost could vary widely depending on the level of detail and functionality of the system as well as the amount of development that is done in-house by the Bi-State MPO.	Bi-State MPO	\$50,000-\$100,000	No	AD2
Long-Term Archived Data Management Projects					
Fort Smith Transit Data Mart	Establish a data mart to gather and store transit information such as ridership statistics and maintenance records for Fort Smith Transit. Cost for this project represents an average range for developing a data mart. Cost could vary widely depending on the level of detail and functionality of the system as well as the amount of development that is done in-house by Fort Smith Transit.	Fort Smith Transit	\$25,000-\$50,000	No	AD1

¹Agency listed is responsible for implementation, operations, and maintenance unless otherwise noted.

²The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.



3.2 Projects of Statewide Significance

Projects of statewide significance are projects that the Bi-State Region felt were important to the Region, but that would most likely be implemented on a statewide level rather than a regional level. The stakeholders recommended that these projects be considered for deployment statewide and expressed a willingness to support the projects as needed. Because the implementation schedule for these projects will be driven at the state level and not the regional level, a timeframe for implementation has not been included. Costs have also not been included as further study will be needed to determine the costs on a statewide level and the costs should not have an impact on funding for the Region.

Table 14 on the following page identifies the projects of statewide significance.



Table 14 – Projects of Statewide Significance

Program Area/Project	Description	Responsible Agency¹	Funding Identified	Applicable Market Packages
AHTD/ODOT Communications Connection	Establish a communications connection between the potential AHTD Statewide TMC in Little Rock and the Oklahoma Department of Transportation (ODOT) Statewide TMC in Oklahoma City to share traveler information and CCTV camera feeds, as well as coordinate 511 operations.	AHTD Central Office Headquarters/ODOT	No	ATMS07 ATMS08
Arkansas 511 Implementation	Implement 511 in the State of Arkansas. If AHTD determines that a test implementation on a regional basis is the most appropriate initial deployment, the Bi-State Region has expressed interest in helping with that deployment to facilitate the dissemination of traveler information for motorists on I-540.	AHTD Central Office Headquarters	No	EM10 ATIS1 ATIS2
Statewide Transit Coordination System	Establish a transit information and reservation coordination system for the State of Arkansas. A statewide system will facilitate the transfer of patrons from one system to another.	To Be Determined	No	APTS2 APTS3 APTS7 APTS8

¹Agency listed is responsible for implementation, operations, and maintenance unless otherwise noted.

3.3 Communications

Communications are often the most important part of any ITS deployment. One of the primary purposes of an ITS architecture is to identify the data that needs to flow between agencies. Much of this data, such as video from CCTV cameras and real time traffic information, can require high bandwidth communication. Reliability of communications is also a concern. ITS functions are often most needed during major incidents, severe weather, or other emergencies. These are the same times that communications systems are often most stressed due to high call volumes and potential damage from severe weather events. Therefore, no ITS deployment is complete without addressing the communications needed.

Unfortunately, a robust and reliable communication system requires a substantial monetary investment. Fiber systems may require miles of underground conduit, environmentally controlled hub buildings, and right-of-way acquisition. Wireless systems often require multiple repeater stations and may be subject to interference from other systems. New technologies, such as Voice over Internet Protocol (VoIP) and Ethernet systems for ITS deployments, are emerging as strong contenders and offer bandwidth and flexibility at a reasonable price.

Maintenance of any communication system must also be carefully considered. Redundancy in the system adds reliability but also adds cost. If redundancy is not built into the communication system then an agency must be prepared with enough resources to quickly diagnose and repair problems. Even with redundancy, failures can happen and require that skilled maintenance personal be available with the necessary parts to make a repair.

Resource sharing between agencies is often a very cost effective way to deploy communications. Resource sharing may be as simple as two departments within a municipality sharing the cost of a fiber installation, or it may be much more complicated, such as all of the partners at a regional TMC determining their share of the deployment cost of the communication system. Resource sharing can also apply to maintenance where multiple agencies establish a maintenance contract with a contractor or share maintenance personnel.

Several of the market packages identified in the Regional ITS Architecture will rely particularly heavily on the communications systems in the Bi-State Region. These include:

- ATMS01 – Network Surveillance;
- ATMS03 – Surface Street Control;
- ATMS04 – Freeway Control;
- ATMS06 – Traffic Information Dissemination;
- ATMS07 – Regional Traffic Control;
- ATMS08 – Incident Management;
- EM05 – Transportation Infrastructure Protection;
- EM06 – Wide Area Alerts;
- MC04 – Weather Information Processing and Distribution;
- APTS2 – Transit Fixed-Route Operations;
- APTS5 – Transit Security;
- APTS8 – Multi-modal Coordination; and
- ATIS1 – Broadcast Traveler Information.



In addition to the above list of market packages, nearly every market package will rely on communications to some extent in order to be fully functional.

In the ITS deployment projects identified in **Section 3.1**, a project to develop a Regional Communications Master Plan is recommended. This master plan should provide direction to the Bi-State Region on the most feasible communication system to deploy. Communication needs should be considered not just of transportation agencies but also of other government agencies to allow for increased potential for resource sharing. Although it may not be possible to implement a complete communication system that serves the region's ITS needs through a single project, having a master plan available will allow agencies to incrementally deploy pieces of the communication system when implementing other projects while ultimately working towards deployment of the full master planned system.



4. MAINTAINING THE REGIONAL ITS DEPLOYMENT PLAN

Just as the ITS Architecture developed for the Bi-State Region addresses the Region's vision for ITS implementation at the time the plan was developed, the ITS Deployment Plan addresses the projects that stakeholders agreed were necessary to implement in order to reach their ITS vision. As the Region grows needs will change, and as technology progresses new ITS opportunities will arise. As an example, at the time this architecture was developed traffic congestion was not a major concern in the Region and therefore traffic management did not play a large role in this version of the Regional ITS Architecture and Deployment Plan. As more development occurs in the Region, traffic congestion could become a larger concern and may require a more significant focus in the ITS Deployment Plan. Shifts in regional focus, as well as changes in the National ITS Architecture, will necessitate that the Bi-State Regional ITS Architecture be updated to remain a useful resource for the Region. These same changes will create new project opportunities or perhaps make projects listed in this ITS Deployment Plan obsolete.

Stakeholders discussed the procedure for updating the Regional ITS Architecture and Deployment Plan at the September 2005 ITS Deployment Plan Meeting. That procedure is documented in the Bi-State Regional ITS Architecture. It outlines a procedure for documenting architecture changes and a schedule to hold a formal review every two years in coordination with the TIP update cycle and a major revision every five years corresponding with the Long Range Plan Update. The project listings in the ITS Deployment Plan should be examined during these scheduled reviews and updated as appropriate to maintain consistency with the regional ITS vision.