Tennessee Department of Transportation
Regional ITS Architectures and Deployment Plans

Jackson Region

Regional ITS Architecture Report

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LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
AD	Archived Data
AMBER	America's Missing: Broadcast Emergency Response
APTS	Advanced Public Transportation Systems
ASTM	American Society for Testing and Materials
ATIS	Advanced Travel Information System
ATMS	Advanced Traffic Management System
AVL	Automated Vehicle Location
CCTV	Closed Circuit Television
CORBA	Common Object Request Broker Architecture
CVISN	Commercial Vehicle Information Systems and Networks
DATEX	Data Exchange
DMS	Dynamic Message Sign
DOT	Department of Transportation
DSRC	Dedicated Short Range Communication
EM	Emergency Management
EMA	Emergency Management Agency
EMS	Emergency Medical Services
EOC	Emergency Operations Center
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HAR	Highway Advisory Radio
HRA	Human Resource Agency
IEEE	Institute of Electrical and Electronics Engineers
IMMS	Incident Management Message Sets
ISO	International Standards Organization
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation System
IVR	Interactive Voice Response
MAC	Medium Access Control

LIST OF ACRONYMS

MC	Maintenance and Construction
MOU	Memorandum of Understanding
MPO	Metropolitan Planning Organization
NEMA	National Emergency Management Association
NOAA	National Oceanic and Atmospheric Administration
NTCIP	National Transportation Communications for ITS Protocol
PSAP	Public Safety Answering Point
RTMS	Remote Traffic Microwave Sensor
RWIS	Road Weather Information System
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible and Efficient Transportation Equity Act – A Legacy for Users
SDO	Standards Development Organization
STMF	Simple Transportation Management Framework
TCIP	Transit Communication Interface Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TDOT	Tennessee Department of Transportation
TEA-21	Transportation Equity Act for the 21st Century
TEMA	Tennessee Management Emergency Agency
THP	Tennessee Highway Patrol
TIP	Transportation Improvement Program
TM	Transportation Management
TMC	Transportation Management Center
TOC	Traffic Operations Center
TraCS	Traffic and Criminal Software
TSIS	TDOT SmartWay Information System
UDP/IP	Universal Datagram Protocol/Internet Protocol
USDOT	United States Department of Transportation
VIVDS	Video Image Vehicle Detection Systems
XML	Extensible Markup Language

1. INTRODUCTION

1.1 Project Overview

Development of a regional intelligent transportation system (ITS) architecture is one of the most important steps in planning for and implementing ITS in a region. 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 ITS architecture allows stakeholders to plan for what they want their system to look like in the long-term and then break out the system into smaller pieces that can be implemented as funding permits.

ITS architectures satisfy the conformity requirements first established in the Transportation Equity Act for the 21st Century (TEA-21) highway bill and continued in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) bill passed in 2005. In response to Section 5206(e) of TEA-21, the Federal Highway Administration (FHWA) issued a final rule and the Federal Transit Administration (FTA) issued a final policy that required regions implementing any ITS project to have an ITS architecture in place by April 2005. After this date, any ITS projects must show conformance with their regional ITS architecture in order to be eligible for funding from FHWA or FTA. Regions that had not yet deployed ITS were given four years to develop an ITS architecture after their first ITS project proceeded to final design.

In June 2006, the Tennessee Department of Transportation (TDOT), in coordination with the Jackson Metropolitan Planning Organization (MPO), began development of the Jackson Regional ITS Architecture. The Regional ITS Architecture has the same geographic boundaries as the Jackson Area MPO study area and focuses on a 20-year vision of ITS for the Region. In addition, a separate ITS Deployment Plan was developed to identify and prioritize specific ITS projects recommended for the Region in order to implement the ITS architecture.

The 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 provided to all stakeholders. The Regional ITS Architecture and Deployment Plan developed reflects an accurate snapshot of existing ITS deployment 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 Jackson Regional ITS Architecture report is organized into five key sections:

Section 1 – Introduction

This section provides an overview of the National ITS Architecture requirements, the Jackson Regional ITS Architecture, and the key features and stakeholders in the Jackson Region.

Section 2 – Regional ITS Architecture Development Process

An overview of the key steps involved in developing the ITS architecture for the Jackson Region is provided in this section. It includes a discussion of stakeholder involvement, architecture workshops, and the architecture development process.

Section 3 – Customization of the National ITS Architecture for the Jackson Region

This section contains a summary of regional needs and details the customization of the National ITS Architecture to meet the ITS vision for the Region. The market packages that were selected for the Region are included in this section and interconnects are presented, including the "sausage diagram" showing the relationships of the key subsystems and elements in the Region.

Section 4 – Application of the Regional ITS Architecture

Functional requirements and standards that apply to the Region, as indicated by the Regional ITS Architecture, are presented in Section 4. Operational concepts identifying stakeholder roles and responsibilities have been prepared and potential agreements to support the sharing of data and resources have been identified.

Section 5 – Maintaining the Regional ITS Architecture

A maintenance plan has been developed for the Jackson Regional ITS Architecture and is included in this section. The plan outlines the procedure for updating the ITS architecture over time.

The Jackson Regional ITS Architecture also contains five appendices:

- Appendix A – Market Package Definitions;
- Appendix B – Customized Market Packages;
- Appendix C – Element Functions;
- Appendix D – Stakeholder Database; and
- Appendix E – Architecture Maintenance Documentation Form.

1.3 The Jackson Region

1.3.1 Geographic Overview

The Jackson Region is defined by the boundaries of the Jackson Area MPO study area as shown in **Figure 1**. The Region encompasses all of Madison County in southwestern Tennessee.

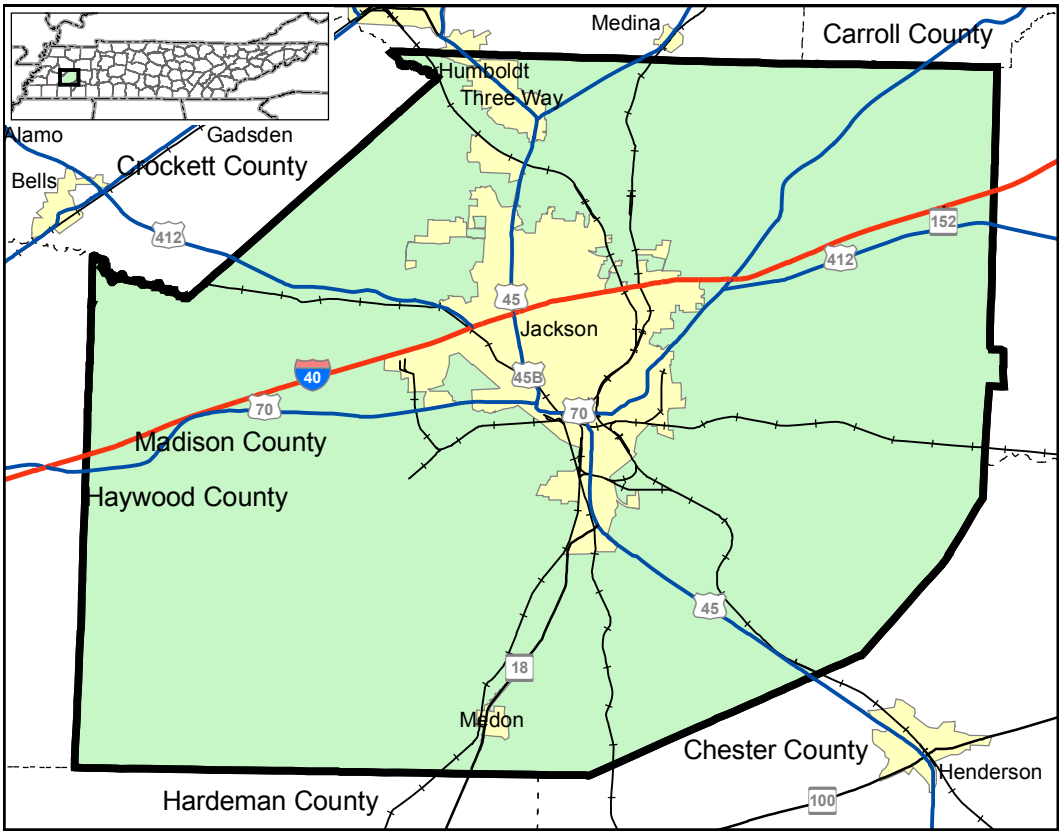

Figure 1 – Jackson Regional Boundaries

While Jackson is the largest city in the Region, there are several other smaller communities within the geographic boundaries of the Region. When developing the stakeholder group, the project team coordinated with the MPO to invite the appropriate cities, counties, state and federal agencies, and area transit providers. The Jackson Transit Authority and Southwest Human Resource Agency (HRA) Transportation are the transit providers that operate within the regional boundaries. The Jackson Transit Authority provides fixed route and paratransit service within the City of Jackson. Southwest HRA Transportation operates demand response service in the rural areas of the Region. A third transit provider, operated by the Northwest Tennessee Human Resource Agency, makes trips into the Region to bring patrons from its service area to medical appointments in the City of Jackson. However, because these trips originate and terminate outside the Region, Northwest HRA Transportation is included in this architecture only where they interact with agencies in the Jackson Region. **Table 1** in Section 1.3.4 identifies the stakeholders that participated in the process.

When developing the architecture, a 20-year vision for ITS in the Region was documented. In the ITS Deployment Plan, the 20-year time frame was broken down into smaller time

periods to prioritize and sequence the projects. The naming convention used for elements in the Jackson Regional ITS Architecture is consistent with the naming convention used in the Statewide ITS Architecture. This consistency provides seamless connections to those other architectures without requiring that they be specifically called out. As in other Regions, statewide commercial vehicle operations were not included in the regional ITS architecture because they are documented in the statewide Commercial Vehicle Information Systems and Networks (CVISN) plan.

1.3.2 Transportation Infrastructure

As illustrated in **Figure 1**, the Region is served by several State and Federal highways. The primary roadway facilities include I-40 and US 45.

I-40 is a divided interstate highway that stretches between the coast in Wilmington, North Carolina and I-15 in California. I-40 connects Memphis and Jackson and provides the Region with access to Nashville and Knoxville as well. US 45 runs north-south through the Region, connecting Jackson to several of the smaller cities in the Region as well as Mississippi.

1.3.3 Jackson Region ITS Plans

The Jackson Region began the development of a Regional ITS Architecture in 2006 when TDOT contracted with a consultant to develop several regional ITS architectures and deployment plans in the State of Tennessee. Version 5.1 of the National ITS Architecture was used in the Architecture development.

It is important to recognize the initial deployment of ITS infrastructure in a region because as of April 2005, in order for a region to receive funding for ITS projects from the Highway Trust Fund the United States Department of Transportation (USDOT) requires that the region have an ITS architecture developed. This requirement only applies to regions with existing ITS infrastructure deployed. For regions that do not have any ITS infrastructure deployed, the USDOT requires that they have an ITS architecture within four years of their first ITS project entering final design.

The Jackson Region has several ITS components deployed in the field. Examples of implementations in the Region include closed loop signal systems with video image vehicle detection systems (VIVDS) and computer aided dispatch. As the Jackson Region pursues funding opportunities for proposed projects, it will be necessary to show that a project fits within the ITS architecture developed for the Region.

1.3.4 Stakeholders

Due to the fact that ITS often transcends traditional transportation infrastructure, it is important to involve non-traditional stakeholders in the architecture development and visioning process. 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.

Table 1 contains a listing of stakeholders in the Jackson Region who have participated in the project workshops or provided input to the study team as to the needs and issues that should be considered as part of the Regional ITS Architecture. Other stakeholders that were invited to participate but were not able to attend were provided minutes of workshops and copies of reports to encourage their participation as much as possible.

Table 1 – Jackson Stakeholder Agencies and Contacts

Stakeholder Agency	Address	Contact
City of Jackson Engineering Department	City Hall 117 East Main Street – Suite 206 Jackson, Tennessee 38301	Scott Chandler
City of Jackson Engineering Department	City Hall 117 East Main Street – Suite 206 Jackson, Tennessee 38301	Mike Robinson
City of Jackson Police Department	Law Enforcement Center 234 Institute Street Jackson, Tennessee 38301	Lt. Ronald D. Adams
City of Jackson Police Department	Law Enforcement Center 234 Institute Street Jackson, Tennessee 38301	Rick Staples
City of Jackson Street Department	180 Conalco Drive Jackson, Tennessee 38301	Gary Leforgee
Federal Highway Administration – TN Division	640 Grassmere Park Road Suite 112 Nashville, Tennessee 37211-3568	Don Gedge
Jackson Area MPO	111 East Main Street, Suite 201 Jackson, Tennessee 38301	Keith C. Donaldson
Jackson Area MPO	City Hall 113 East Main Street – Suite 204 Jackson, Tennessee 38301	Stanley T. Pilant
Jackson Transit Authority	241 East Deaderick Street Jackson, Tennessee 38301	Michele Jackson
Jackson/Madison County EMA	234 Institute B-280 Jackson, Tennessee 38301	Marty Clements
Jackson/Madison County EMA	234 Institute Street Jackson, Tennessee 38301	Cory Lay
Madison County	Madison County Courthouse 100 E. Main Street, Suite 302 Jackson, Tennessee 38301	Jerry Gist
Madison County	168 Adair Road Jackson, Tennessee 38305	Joe (Smokey) Roland
Madison County Fire Department	722 Harts Bridge Road Jackson, Tennessee 38301	Kelly Holmes
Southwest Tennessee HRA Transportation	1527 White Avenue Henderson, Tennessee 38340	Diana Turner
Tennessee Department of Transportation – Long Range Planning Division	505 Deadrick Street Suite 900, James K. Polk Bldg. Nashville, Tennessee 37243-0334	Joe Ed Armstrong, PhD
Tennessee Department of Transportation – Long Range Planning Division	505 Deadrick Street Suite 900, James K. Polk Bldg. Nashville, Tennessee 37243-0334	Joe Roach
Tennessee Department of Transportation – Region 4	300 Benchmark Place Jackson, Tennessee 38301	Jason Moody
Tennessee Department of Transportation – Region 4	300 Benchmark Place Jackson, Tennessee 38301	Joe Warren
Tennessee Department of Transportation – Design Division, Signals and Signing Section	Traffic Design Section, ITS Office Suite 1000, James K. Polk Bldg. Nashville, Tennessee 37243	Pete Hiett

2. REGIONAL ITS ARCHITECTURE DEVELOPMENT PROCESS

Development of the Regional ITS Architecture and Deployment Plan for the Jackson Region relied heavily on stakeholder input to ensure that the architecture reflected local needs. A series of four workshops was held with stakeholders to gather input, and draft documents were made available to stakeholders for review and comment.

The process followed for the Jackson Region was designed to ensure that stakeholders could provide input and review for the development of the Region's ITS Architecture and Deployment Plan. **Figure 2** illustrates the process followed.

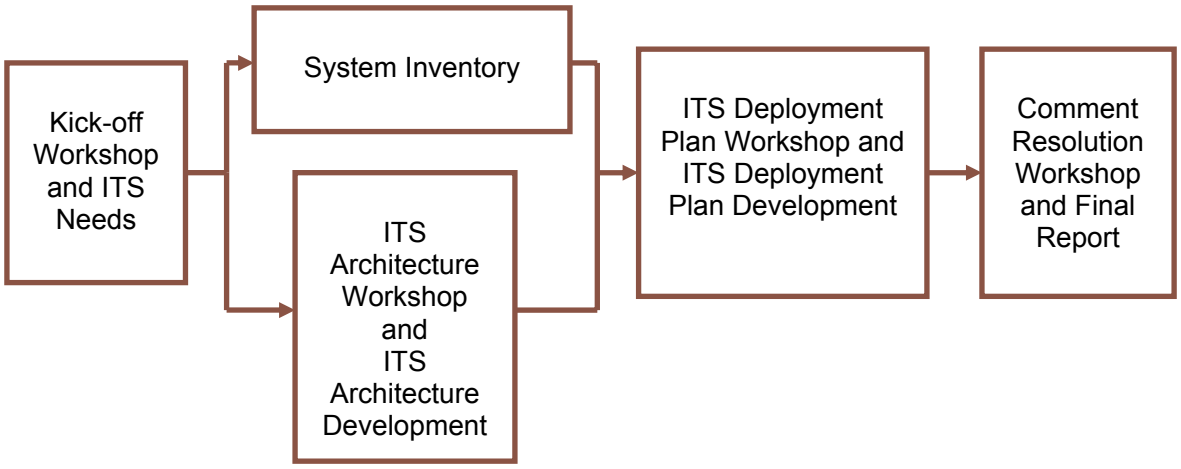

Figure 2 – Jackson Regional ITS Architecture and Deployment Plan Development Process

A total of four workshops with stakeholders over a period of four months were used to develop the Jackson Regional ITS Architecture and Deployment Plan. These workshops included:

- Kick-Off Workshop;
- Regional ITS Architecture Development Workshop;
- ITS Deployment Plan Workshop; and
- Comment Resolution Workshop.

Key components of the process are described below:

Task 1 – Kick-Off Workshop and ITS Needs: A stakeholder group was identified that included representatives from regional transportation, transit, and emergency management agencies. The group was invited to the project Kick-Off Workshop where ITS needs for the Region were identified and dates for upcoming workshops agreed upon.

Task 2 – System Inventory: Collecting information for the system inventory began at the Kick-Off Workshop through discussions with the stakeholders to determine existing and planned ITS elements in the Region. After the Kick-Off Workshop, follow-up calls were conducted with several local stakeholders to gather additional input.

Task 3 – ITS Architecture Workshop and ITS Architecture Development: The purpose of the Regional ITS Architecture Workshop was to review the system inventory with stakeholders and develop the Jackson Regional ITS Architecture. Training on the National ITS Architecture was integrated into the workshop so that key elements of the architecture, such as market packages, could be explained

prior to the selection and editing of these elements. The result of the Regional ITS Architecture Workshop was an ITS Architecture for the Jackson Region that included a system inventory, interconnect diagram, customized market packages, functional requirements, and relevant ITS standards. Following the workshop, a Draft Regional ITS Architecture document was prepared and sent to stakeholders for review and comment.

Task 4 – ITS Deployment Plan Workshop and ITS Deployment Plan Development: A draft project listing for the Region was presented to stakeholders at the Regional ITS Deployment Plan Workshop. Stakeholders were asked to provide input on the recommended projects, responsible agencies, associated costs, and deployment timeframe. Following the workshop, a Draft Regional ITS Deployment Plan document was prepared and sent to stakeholders for review and comment.

Task 5 – Comment Resolution Workshop and Final Report: A Comment Resolution Workshop was held with stakeholders to review the Draft Regional ITS Architecture and the Draft Regional ITS Deployment Plan. Next steps for the Region were also discussed. Comments were incorporated and a final Regional ITS Architecture and Regional ITS Deployment Plan were developed.

3. CUSTOMIZATION OF THE NATIONAL ITS ARCHITECTURE FOR THE JACKSON REGION

3.1 Systems Inventory

An important initial step in the architecture development process is to establish an inventory of existing ITS elements. At the Kick-Off Workshop and through subsequent discussions with agency representatives, Jackson Region stakeholders provided the team with information about existing and planned systems that would play a role in the Region's ITS architecture.

The National ITS Architecture has eight groups of ITS service areas. Existing, planned, and future systems in the Region were identified in the following service areas:

- ***Traffic Management*** – includes the TDOT SmartWay Traffic Management Center (TMC) planned for Memphis as well as other existing and future TMCs and traffic operations centers (TOCs), detection systems, closed circuit television (CCTV) cameras, fixed and portable dynamic message signs (DMS), and other related technologies.
- ***Emergency Management*** – includes emergency operations/management centers, improved information sharing among traffic and emergency services, automated vehicle location (AVL) on emergency vehicles, traffic signal preemption for emergency vehicles, and wide-area alerts.
- ***Maintenance and Construction Management*** – includes work zone management, roadway maintenance and construction information, and road weather detection systems.
- ***Public Transportation Management*** – includes transit and paratransit AVL, transit travel information systems, electronic fare collection, and transit security.
- ***Commercial Vehicle Operations*** – includes coordination with CVISN efforts.
- ***Traveler Information*** – includes broadcast traveler information, traveler information kiosks, and highway advisory radio (HAR).
- ***Archived Data Management*** – includes electronic data management and archiving systems.
- ***Vehicle Safety*** – these systems were discussed, but at this time this service group is primarily a private sector initiative to incorporate technologies such as intersection collision avoidance and automated vehicle operation systems into vehicles.

3.2 Regional Needs

Needs from the Region were identified by Stakeholders at the Kick-Off Workshop held in July of 2006. The needs identified provided guidance for determining which market packages should be included in the architecture. Stakeholders identified ITS needs for the Jackson Region in the following areas:

- Traffic management;
- Emergency management;
- Maintenance and construction management;
- Public transportation management;
- Traveler information; and
- Archived data management.

Section 3.4.3 contains additional information about the specific needs identified and relates those needs to the market packages that document the corresponding ITS service.

3.3 Element Customization

The inventory and needs documented at the Kick-Off Workshop are the starting point for developing an ITS architecture for the Jackson Region. These ITS systems and components are used to customize the National ITS Architecture and create the architecture for the Jackson Region.

When developing customized elements, the stakeholder group agreed to create individual traffic, maintenance, and emergency management elements for the City of Jackson. The other smaller communities in the Region were documented as part of the municipal elements. This documentation allows the communities to be included in the Regional ITS Architecture, and therefore eligible to use federal monies on potential future ITS deployments.

3.3.1 Subsystems and Terminators

Each identified system or component in the Jackson Regional ITS inventory was mapped to a subsystem or terminator in the National ITS Architecture. Subsystems and terminators are the entities that represent systems in ITS.

Subsystems are the highest level building blocks of the physical architecture, and the National ITS Architecture groups them into four major classes: Centers, Field, Vehicles, and Travelers. Each of these major classes includes various subsystems that represent a set of transportation functions (or processes). Each set of function is grouped under one agency, jurisdiction, or location, and correspond to physical elements such as: traffic operations centers, traffic signals, or vehicles. **Figure 3** shows the National ITS Architecture subsystems. This figure, also known as the "sausage diagram," is a standard interconnect diagram, showing the relationships of the various subsystems within the architecture. A customized interconnect diagram for the Jackson Region is shown in **Figure 4**. Communication functions between the subsystems are represented in the ovals. Fixed-point to fixed-point communications include not only twisted pair and fiber optic technologies, but also wireless technologies such as microwave and spread spectrum.

Terminators are the people, systems, other facilities, and environmental conditions outside of ITS that need to communicate or interface with ITS subsystems. Terminators help define the boundaries of the National ITS Architecture as well as a regional system. Examples of terminators include: drivers, traffic operations personnel, and information service providers.

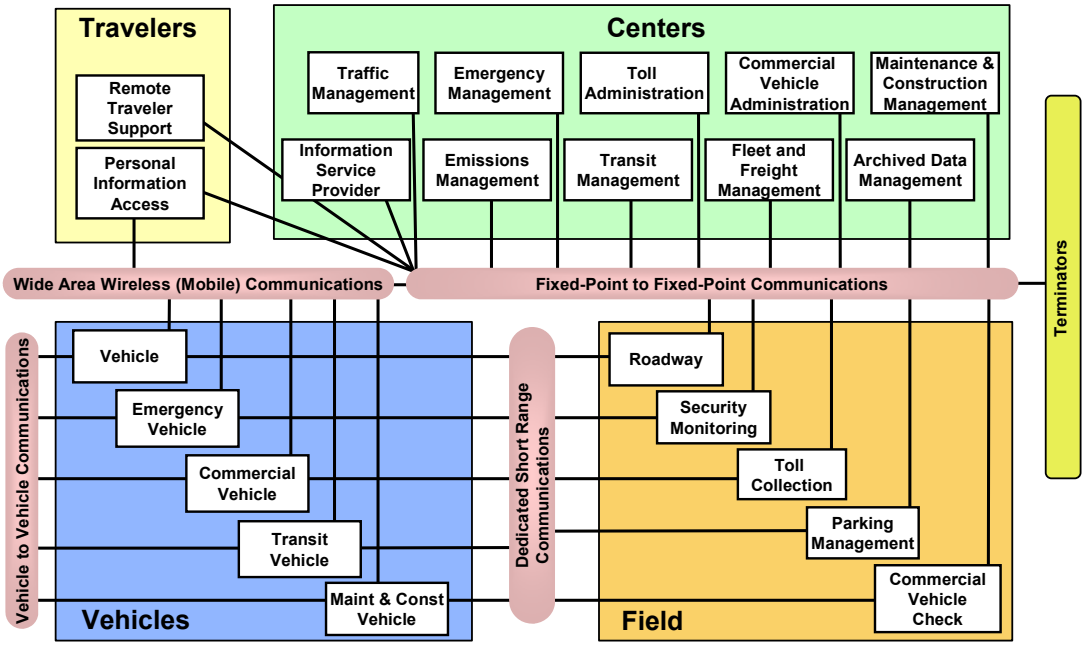

Figure 3 – National ITS Architecture Physical Subsystem Interconnect Diagram

3.3.2 ITS Inventory by Stakeholder

Each stakeholder is associated with one or more systems or elements (subsystems and terminators) that make up the transportation system in the Jackson Region. A listing of stakeholders as identified in the architecture can be found in **Table 2** along with a description of the stakeholder. For example, rather than individually documenting each of the smaller municipalities in the Region, a single stakeholder was created for municipal agencies which represents the cities and towns not specifically called out in the architecture. **Table 3** sorts the inventory by stakeholder so that each stakeholder can easily identify and review all of the architecture elements associated with their agency. The table includes the status of the element. In many cases an element classified as existing might still need to be enhanced to attain the service level desired by the Region.

Table 2 – Jackson Region Stakeholder Descriptions

Stakeholder	Stakeholder Description
City of Jackson	Municipal government for the City of Jackson, Tennessee. Covers all city departments including those that deal with traffic and public safety.
Private Information Provider	Private sector business responsible for the gathering and distribution of traveler information. This service is typically provided on a subscription basis.
TDOT	The Tennessee Department of Transportation is responsible for the construction, maintenance, and operation of roadways in the State of Tennessee.
Municipal Government	Municipal government for the City of Medon and other municipalities within the Region that are not specifically called out. Covers all city departments including those that deal with traffic and public safety.
THP	Tennessee Highway Patrol. State law enforcement agency that enforces traffic safety laws as well as commercial vehicle regulations.
Jackson Transit Authority	Transit provider that operates both fixed route and paratransit service within the City of Jackson.
Southwest Tennessee Human Resource Agency	Among other Regional social services, the human resource agency operates Southwest HRA Transportation. Southwest HRA provides demand response transit service in the Region outside the Jackson Transit Authority service area.
Jackson/Madison County Emergency Management Agency	Emergency management agency for the City of Jackson and all of Madison County.
Rail Operators	Companies that operate trains and/or are responsible for the maintenance and operations of railroad tracks.
TEMA	Tennessee Emergency Management Agency. The agency is responsible for emergency operations during a disaster or large scale incident.
Tennessee Bureau of Investigation	Statewide law enforcement agency responsible for issuing statewide AMBER Alerts in Tennessee.
Financial Institution	Handles exchange of money for transit electronic fare collection.
Tennessee Department of Health and Human Services	State department that manages funding for medical transportation services.
Media	Local media outlets. This can include television stations, newspapers, radio stations, and their associated websites.
System Users	All of the users of the transportation system.
Jackson Energy Authority	Energy provider for the City of Jackson. Also performs traffic signal maintenance.
Madison County	County government for Madison County. Covers all county departments including Emergency Medical Services (EMS), Fire, Sheriff, and Highway Departments.
Other States	Emergency or traffic management agencies in other states adjacent to Tennessee. In the Jackson Region this includes Alabama, Arkansas, Kentucky, and Mississippi.
NOAA	National Oceanic and Atmospheric Administration, agency that gathers weather information and issues severe weather warnings.
Northwest Tennessee Human Resource Agency	Among other Regional social services, the human resource agency operates demand response transit in a service area adjacent to the Jackson Region. While the agency does not serve patrons within the Region, they do enter the Region to bring their patrons to medical appointments in Jackson.
Other Agencies	This stakeholder represents a wide variety of agencies. The associated elements are groups of agencies or providers that do not have a primary stakeholder agency.

Table 3 – Jackson Region Inventory of ITS Elements

Stakeholder	Element Name	Element Description	Status
City of Jackson	City of Jackson Backup TOC (JEA Operations Center)	Provides backup traffic operations capabilities for the City of Jackson. The City of Jackson leases communications from the Jackson Energy Authority and the JEA Operations Center provides an additional access point to this data. Basic network surveillance and signal operations capabilities can be carried out by traffic personnel at this location should the TOC become disabled.	Existing
	City of Jackson CCTV	Closed-circuit television (CCTV) cameras operated by the City of Jackson TOC for traffic condition monitoring and management of incidents.	Planned
	City of Jackson Central Dispatch	Central Dispatch is responsible for the dispatch of all City of Jackson public safety vehicles (police and fire). After hours Central Dispatch will also dispatch the Street Department on-call emergency responder.	Existing
	City of Jackson City Engineers Office	Responsible for the administration of maintenance and construction projects within the City.	Existing
	City of Jackson DMS	Dynamic message signs (DMS) for traffic information dissemination operated by the City of Jackson.	Existing
	City of Jackson Engineering Department	The City of Jackson Engineering Department's responsibilities include traffic signs and signalization and street/road/bridge construction and maintenance.	Existing
	City of Jackson Field Sensors	Roadway equipment used to detect vehicle volumes and/or speeds. This information is used in the operation of the traffic signal system and collected by the Traffic Operations Center (TOC). Jackson field sensors include Video Image Vehicle Detection Systems (VIVDS) and any other vehicle detection.	Existing
	City of Jackson Maintenance Management System	Asset management tracking system for the City of Jackson. Utilized to track maintenance requests and service responses.	Planned
	City of Jackson Police Department	City of Jackson Police Department. The emergency dispatch functions for the Police Department are included in the City of Jackson Central Dispatch. Non-emergency functions include the operation of the City's red-light running camera system and future speed detection system. The Department is also responsible for the collection of crash data.	Existing

Table 3 – Jackson Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
City of Jackson (continued)	City of Jackson Public Safety Vehicles	Public safety vehicles include City of Jackson Police Department patrol cars and helicopters and Fire Department vehicles.	Existing
	City of Jackson Red-Light Running Cameras	Red-light running cameras in the City of Jackson used to document violators. Violations are processed by the City of Jackson Police Department.	Existing
	City of Jackson RWIS Sensors	Road weather information systems (RWIS) installed in the field to gather information about the roadways such as temperature and moisture levels.	Planned
	City of Jackson Speed Monitoring Equipment	Field equipment used for monitoring roadway speeds. Speed monitoring equipment is owned by the City of Jackson Police Department.	Existing
	City of Jackson Street Department	Department that oversees the maintenance of streets, sidewalks, and roadway right-of-way.	Existing
	City of Jackson Street Department On-Call Emergency Responder	Street department employee on-call for emergency situations requiring the Departments assistance.	Existing
	City of Jackson Street Department Vehicles	Vehicles used in maintenance operations.	Existing
	City of Jackson TOC	Traffic operations center for the City of Jackson. Responsible for operations of the traffic signal system, CCTV cameras, and DMS.	Planned
	City of Jackson Traffic Data Archive	Archive that contains historical traffic data such as volume and speed information.	Planned
	City of Jackson Traffic Signals	Traffic signal system operated by the City of Jackson TOC.	Existing
	City of Jackson Website	Website for the City of Jackson. Includes information on City departments and in the future it is envisioned that the website will have real-time information about roadway conditions.	Existing
	City Staff	Employees of the City of Jackson.	Existing
	Jackson Area MPO	Jackson Area Metropolitan Planning Organization. The organization is responsible for transportation planning in the City of Jackson and the surrounding area. The Metropolitan Planning Organization (MPO) is associated with the City of Jackson Planning Department.	Existing
	Jackson Area MPO Data Archive	Archive for transportation information such as traffic counts or transit ridership data for use in regional transportation planning.	Planned
	Jackson/Madison County Hospital	Hospital located in the City of Jackson serving all of Madison County.	Existing

Table 3 – Jackson Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
City of Jackson (continued)	Madison County E911 Dispatch	Answers all 911 calls made from within the county and then forwards the call to the appropriate dispatcher.	Existing
Financial Institution	Financial Service Provider	Handles exchange of money for transit electronic payment collection.	Planned
Jackson Transit Authority	Jackson Energy Authority	Energy provider for the City of Jackson. Also performs traffic signal maintenance.	Existing
	Electronic Fare Payment Card	Medium for collection of transit fares electronically.	Planned
	Jackson Transit Authority Data Archive	The Transit Data Archive for the city of Jackson. Used by National Transit Database, Federal Transit Administration, and TDOT Office of Public Transportation,	Planned
	Jackson Transit Authority Dispatch Center	Transit dispatch center responsible for the tracking, scheduling and dispatching of fixed route and paratransit vehicles operated by Jackson Transit Authority.	Existing
	Jackson Transit Authority Fixed Route Vehicles	Transit vehicles that operate on fixed routes within Jackson.	Planned
	Jackson Transit Authority Kiosks	Kiosks for dissemination of transit traveler information. Kiosks can also be used for the purchase and recharging of electronic fare payment cards.	Planned
	Jackson Transit Authority Paratransit Vehicles	Jackson Transit Authority vehicles that provide transit means for disabled travelers.	Planned
	Jackson Transit Authority Transit Center CCTV Surveillance	CCTV surveillance at the Jackson Transit Authority Transit Center.	Existing
	Jackson Transit Authority Website	Website with information about fares and schedules. At this time the website is static.	Planned
Jackson/Madison County Emergency Management Agency	Jackson/Madison County EMA	Emergency management agency for all of Madison County, including the City of Jackson. Responsible for communications with Tennessee Management Emergency Agency (TEMA) and coordination of local resources during a disaster or large scale incident.	Existing
Madison County	Madison County EMS Dispatch	Receives 911 calls from Madison County E911 Dispatch and in turn dispatches Emergency Medical Services (EMS) vehicles for Madison County, including the City of Jackson.	Existing
	Madison County EMS Vehicles	Vehicles operated by Madison County EMS.	Existing

Table 3 – Jackson Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
Madison County (continued)	Madison County Fire Dispatch	Receives 911 calls from Madison County E911 Dispatch and in turn dispatches fire vehicles for Madison County, outside the City of Jackson.	Existing
	Madison County Fire Vehicles	Vehicles operated by the Madison County Fire Department	Existing
	Madison County Highway Department	County department that oversees the maintenance of county roadways within the region.	Existing
	Madison County Sheriff Dispatch	Receives 911 calls from Madison County E911 Dispatch and in turn dispatches sheriff vehicles within Madison County.	Existing
	Madison County Sheriff Vehicles	Vehicles operated by the Madison County Sheriff's Department	Existing
Media	Local Print and Broadcast Media	Local media that provide traffic or incident information to the public.	Existing
Municipal Government	Municipal Public Safety Dispatch	Responsible for the dispatch of municipal public safety vehicles.	Planned
	Municipal Public Safety Vehicles	Municipal law enforcement, fire, and EMS vehicles.	Planned
	Municipal TOC	Municipal Traffic Operations Center responsible for municipal signal system operations.	Planned
	Municipal Traffic Signals	Municipal traffic signal systems	Existing
NOAA	National Weather Service	Provides official US weather, marine, fire and aviation forecasts, warnings, meteorological products, climate forecasts, and information about meteorology.	Planned
Northwest Tennessee Human Resource Agency	Northwest HRA Transportation Dispatch Center	Responsible for the dispatch and scheduling of demand response transit trips within the agency's service area. Northwest HRA Transportation enters the Jackson Region to take it's patrons to medical appointments in the City of Jackson, but no trips originate within the Region.	Planned
Other Agencies	Other Maintenance and Construction Management Agencies	Additional maintenance and construction operations with which information is shared for coordination in an emergency situation.	Planned
	Other Traffic Management Agencies	Additional traffic management agencies with which information is shared for coordination in an emergency situation.	Planned
	Private Transportation Providers	Private providers of transportation services in the Region such as taxis and intercity bus services.	Planned
Other States	Alabama DOT	Alabama Department of Transportation, responsible for the maintenance and operations of roadways in the State of Alabama.	Existing

Table 3 – Jackson Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
Other States (continued)	Arkansas DOT	Arkansas State Highway and Transportation Department, responsible for the maintenance and operations of roadways in the State of Arkansas.	Existing
	Kentucky DOT	Kentucky Department of Transportation, responsible for the maintenance and operations of roadways in the State of Kentucky.	Existing
	Mississippi DOT	Mississippi Department of Transportation, responsible for the maintenance and operations of roadways in the State of Mississippi.	Existing
	Other States Maintenance	Maintenance operations in adjacent states.	Planned
Private Information Provider	Private Sector Traveler Information Services	Subscription based traveler information service.	Existing
Rail Operators	Rail Operations	Centers responsible for the operation and tracking of trains.	Planned
Rail Operators	Rail Operator Wayside Equipment	Equipment located along the tracks including railroad crossing gates, bells, and lights as well as the interface to the traffic signal controller indicating the presence of a train.	Existing
Southwest Tennessee Human Resource Agency	Southwest HRA Transportation Data Archive	Data Archive for Southwest HRA Transportation used by the Tennessee Department of Transportation and the Southwest HRA.	Planned
	Southwest HRA Transportation Dispatch Center	Transit dispatch center responsible for the tracking, scheduling and dispatching of demand response vehicles operated by Southwest HRA.	Existing
	Southwest HRA Transportation Vehicles	Southwest HRA demand response vehicles.	Existing
	Southwest HRA Transportation Website	Website with information about fares and trip scheduling. At this time the website contains static information.	Existing
System Users	Archive Data Users	Those who request information from the data archive systems.	Planned
	Driver	Individual operating a vehicle on roadways within the Region.	Existing
	Private Traveler Personal Computing Devices	Computing devices that travelers use to access public information.	Planned
	Traveler	Caller seeking information from 511 system.	Existing
TDOT	Other TDOT Region Construction Office	Other Tennessee Department of Transportation regional construction offices besides the Region 4 Construction Office.	Existing

Table 3 – Jackson Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
TDOT (continued)	Other TDOT Region Maintenance	Other Tennessee Department of Transportation regional maintenance offices.	Existing
	TDOT Beacon Warning Signs	Warning system that provides feedback to drivers when an overheight vehicle is detected.	Planned
	TDOT CCTV	CCTV cameras for traffic surveillance and incident management.	Existing
	TDOT District Maintenance	Each Tennessee Department of Transportation Region contains several TDOT district maintenance offices. These district offices handle most of the routine roadway maintenance and respond to incidents when their services are requested by local emergency management.	Existing
	TDOT DMS	DMS for traffic information dissemination.	Existing
	TDOT Emergency Services Coordinator	The Tennessee Department of Transportation emergency services coordinator is responsible for managing the TDOT response in a large scale incident or disaster in which TEMA activates the state Emergency Operations Center (EOC).	Existing
	TDOT Field Sensors	Roadway equipment used to detect vehicle volumes and/or speeds. Includes equipment such as VIVDS, Remote Traffic microwave Sensor (RTMS) or traditional loops.	Existing
	TDOT HAR	Highway advisory radio for traffic information dissemination.	Existing
	TDOT HELP Vehicles	Roadway service patrol vehicles. Currently operate in Memphis and are dispatched to the Jackson Region for special events or large incidents.	Existing
	TDOT Maintenance Headquarters	The Tennessee Department of Transportation's maintenance department headquarters.	Planned
	TDOT Maintenance Vehicles	Tennessee Department of Transportation vehicles used in maintenance operations.	Existing
	TDOT Overheight Vehicle Detection	Equipment operated by the Tennessee Department of Transportation which detects overheight vehicles.	Planned
	TDOT Public Information Office	Tennessee Department of Transportation department responsible for the dissemination of traffic information to the media and the public.	Planned

Table 3 – Jackson Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
TDOT (continued)	TDOT Region 1 TMC – Knoxville	Traffic management center for Region 1, located in Knoxville. Responsible for the operation of the ITS equipment located in Region 1. This includes the freeway management system in Knoxville as well as rural ITS deployments.	Existing
	TDOT Region 2 TMC – Chattanooga	Traffic management center for Region 2, located in Chattanooga. Responsible for the operation of the ITS equipment located in Region 2. This includes the freeway management system in Chattanooga as well as rural ITS deployments.	Existing
	TDOT Region 3 TMC – Nashville	Traffic management center for Region 3, located in Nashville. Responsible for the operation of the ITS equipment located in Region 3. This includes the freeway management system in Nashville as well as rural ITS deployments.	Existing
	TDOT Region 4 Construction Office	The Tennessee Department of Transportation office responsible for oversight of construction projects in Region 4.	Existing
	TDOT Region 4 Engineers Office	The Region Engineer's office is responsible for administration of maintenance and construction projects within the Region as well as communicating work zone information to the public through the Public Information Officer.	Existing
	TDOT Region 4 HELP Dispatch	Roadway service patrol dispatch center located in Memphis. Currently service is limited to the Memphis area except in the case of a large scale incident or special events.	Existing
	TDOT Region 4 Maintenance	Region 4 Maintenance headquarters. Responsible for maintenance operations in the Region; however, most routine maintenance is handled by the district maintenance offices. There are several district maintenance offices in Region 4.	Existing
	TDOT Region 4 TMC – Memphis	Traffic management center for Region 4, located in Memphis. Responsible for the operation of the ITS equipment located in Region 4. This includes the freeway management system in Memphis as well as rural ITS deployments. The Jackson Region is located in Region 4.	Existing
	TDOT RWIS Sensors	Road weather information system sensors to monitor road conditions.	Planned
	TDOT Short Range and Project Planning Division Archive	Tennessee Department of Transportation group responsible for traffic data collection and analysis as well as short range planning.	Planned

Table 3 – Jackson Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
TDOT (continued)	TDOT Smart Work Zone Equipment	Portable ITS equipment that can be used in work zones to more efficiently manage traffic and provide traveler information. Includes CCTV, vehicle detection, and/or DMS.	Planned
	TDOT SmartWay Information System (TSIS)	TDOT SmartWay Information System (TSIS) is a statewide roadways conditions database. Currently information can be entered by District and Regional maintenance personnel as well as staff at any of the traffic management centers. TSIS feeds the Statewide 511 system.	Existing
	TDOT Smartway Website	Website providing road network conditions information. Much of the information for the website comes from TSIS. In areas that have an operational TDOT Region TMC, additional information may be available such as camera views.	Existing
	Tennessee 511 System	511 Traveler information system central server.	Existing
	Tennessee 511 IVR	Tennessee 511 Interactive Voice Response (IVR) system. TDOT contracts the IVR operation to a vendor. The IVR accepts 511 callers' requests and provides responses to specific traveler information needs. This is the customer interface component of the 511 system.	Existing
	Tennessee GoSmart Kiosks	Kiosks in rest areas that provide traveler information including weather and roadway conditions.	Existing
TEMA	TEMA	The Tennessee Emergency Management Agency manages emergency operations during a disaster or large scale incident.	Existing
Tennessee Bureau of Investigation	Tennessee Bureau of Investigation	Responsible for issuing statewide AMBER Alerts in Tennessee.	Existing
Tennessee Department of Health and Human Services	Service Agency	Agency responsible for payment of transit fares for medical transportation as part of government subsidized medical care. This includes TennCare, Medicare, and Veteran Affairs programs.	Existing
THP	THP Dispatch	Tennessee Highway Patrol (THP) dispatch center. There are several THP dispatch centers around the State.	Existing
	THP Vehicles	THP vehicles.	Planned
	TraCS Database	Traffic and criminal software owned by the Tennessee Department of Safety. THP operates the system.	Existing

3.3.3 Top Level Regional System Interconnect Diagram

A system interconnect diagram, or "sausage diagram" (shown previously in **Figure 3**), shows the systems and primary interconnects in the Region. The National ITS Architecture interconnect diagram has been customized for the Jackson Region based on the system inventory and information gathered from the stakeholders. **Figure 4** summarizes the existing and planned ITS elements for the Jackson Region in the context of a physical interconnect. Subsystems and elements specific to the Region are called out in the boxes surrounding the main interconnect diagram, and these are color-coded to the subsystem with which they are associated.

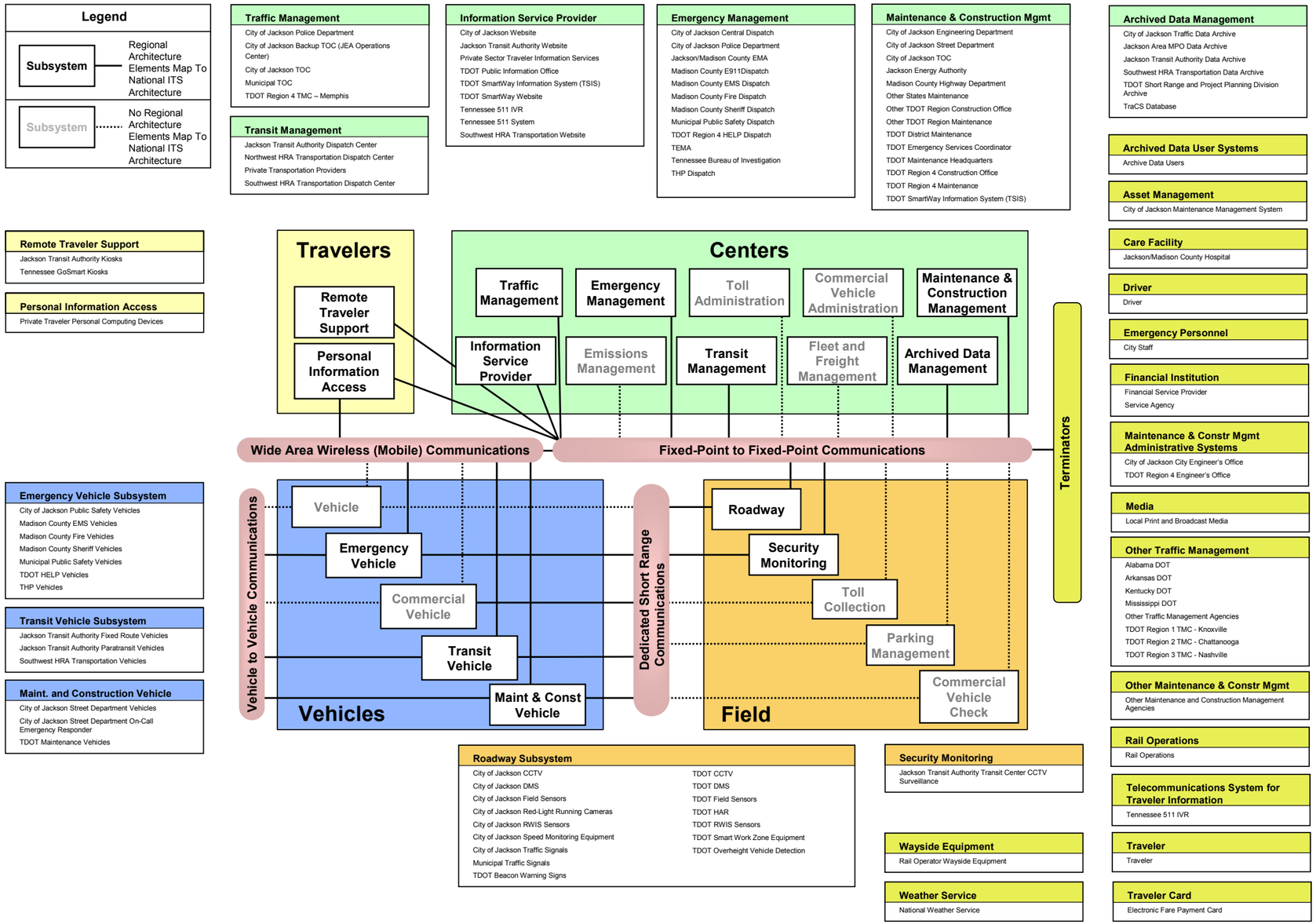

Figure 4 – Jackson Regional System Interconnect Diagram

3.4 Market Packages

Upon completion of the system inventory, the next step in the development of the architecture was to identify the transportation services that are important to the Jackson Region. In the National ITS Architecture, services are referred to as market packages. Market packages can include several stakeholders and elements that work together to provide a service in the Region. Examples of market packages from the National ITS Architecture include Network Surveillance, Traffic Information Dissemination, and Transit Vehicle Tracking. There are currently a total of 85 market packages identified in the National ITS Architecture Version 5.1

The market packages are grouped together into eight ITS service areas: Traffic Management, Emergency Management, Maintenance and Construction Management, Public Transportation Management, Commercial Vehicle Operations, Traveler Information, Archived Data Management, and Vehicle Safety. As mentioned earlier in Section 3.1, Vehicle Safety was not included in the Jackson Regional ITS Architecture because implementation of those market packages would be by private sector automobile and information service providers.

3.4.1 Selection and Prioritization of Regional Market Packages

In the Jackson Region, the National ITS Architecture market packages were reviewed by the stakeholders and selected based on the relevance of the service that the market package could provide to the Region. 33 market packages were selected for implementation in the Region. They are identified in **Table 4**. Stakeholders prioritized the selected market packages during the workshop, and the table organizes the market packages into service areas and priority groupings.

TDOT is leading a separate effort to develop and implement the CVISN program. CVISN addresses commercial vehicle operations, including ITS, on a statewide level and includes such applications as electronic clearance, safety enforcement, and registration. Unless a specific need was identified in the Jackson Region that could be addressed locally, the commercial vehicle operations market packages were not selected and instead will be covered in the CVISN effort to ensure consistency.

After selecting the market packages that were applicable for the Region, stakeholders reviewed each market package and the elements that could be included to customize it for the Region. This customization is discussed further in the following section.

Table 4 – Jackson Region Market Package Prioritization by Functional Area

High Priority Market Packages	Medium Priority Market Packages	Low Priority Market Packages
Travel and Traffic Management		
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 ATMS15 Railroad Operations Coordination ATMS19 Speed Monitoring	
Emergency Management		
EM01 Emergency Call-Taking and Dispatch EM02 Emergency Routing EM06 Wide-Area Alert EM10 Disaster Traveler Information	EM04 Roadway Service Patrols EM08 Disaster Response and Recovery EM09 Evacuation and Reentry Management	
Maintenance and Construction Management		
MC03 Road Weather Data Collection MC04 Weather Information Processing and Distribution MC08 Work Zone Management MC10 Maintenance and Construction Activity Coordination	MC01 Maintenance and Construction Vehicle and Equipment Tracking MC07 Roadway Maintenance and Construction	
Public Transportation Management		
APTS1 Transit Vehicle Tracking APTS2 Transit Fixed-Route Operations APTS3 Demand Response Transit Operations APTS5 Transit Security	APTS4 Transit Passenger and Fare Management APTS7 Multi-modal Coordination APTS8 Transit Traveler Information	APTS6 Transit Maintenance
Traveler Information		
ATIS1 Broadcast Traveler Information ATIS2 Interactive Traveler Information		
Archived Data Management		
	AD1 ITS Data Mart	AD2 ITS Data Warehouse

3.4.2 Customized Market Packages

The market packages in the National ITS Architecture were customized to reflect the unique systems, subsystems, and terminators in the Jackson Region. Each market package is shown graphically with the market package name, local agencies involved and desired data flows included. Market packages represent a service that will be deployed as an integrated capability.

Figure 5 is an example of an ATMS market package for Surface Street Control that has been customized for the Region. This market package shows the two subsystems, Traffic Management and Roadway, and the associated entities (City of Jackson TOC and City of Jackson Traffic Signals) for surface street control in the Region. Data flows between the subsystems indicate what information is being shared. The remainder of the market packages that were customized for the Jackson Region is shown in **Appendix B**.

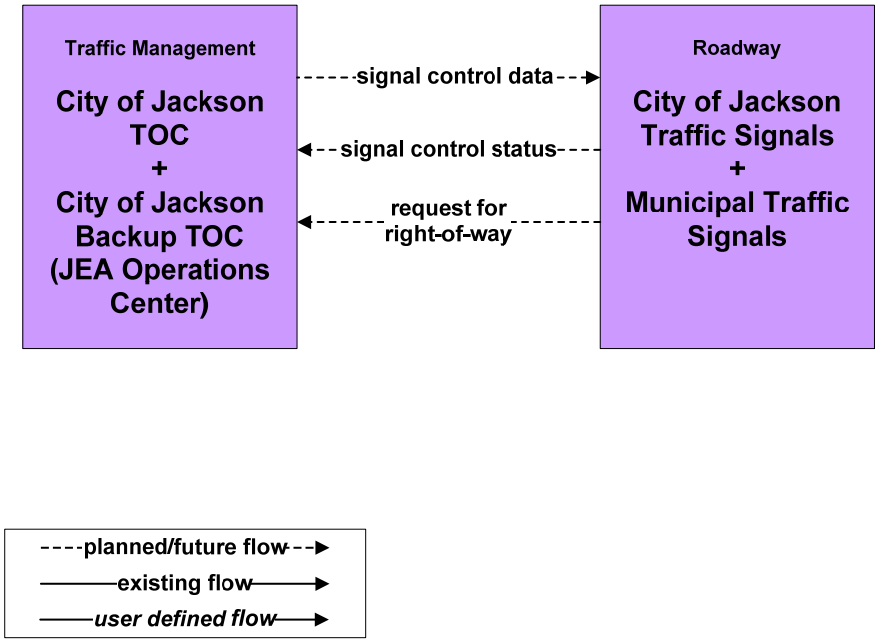

Figure 5 – Example Market Package Diagram: Surface Street Control

3.4.3 Regional ITS Needs and Customized Market Packages

Input received from stakeholders at the Kickoff Workshop provided valuable input for the market package customization process. The specific needs identified are included in **Table 5**. The table also identifies which market package documents the particular ITS need.

Table 5 – Regional ITS Needs and Corresponding Market Packages

ITS Need	Market Package
Travel and Traffic Management	
City of Jackson TOC for control of closed loop signal system	ATMS03
City of Jackson portable DMS to provide traveler information for special events and incidents	ATMS06 ATMS08
Need communications connections between agencies to improve incident management	ATMS08
City of Jackson CCTV cameras for traffic surveillance and incident detection and verification	ATMS01
City of Jackson vehicle detection	ATMS01
Need a communications connection between the City of Jackson TOC and the TDOT TMC	ATMS07
Need DMS before the US 45 and US 45 Bypass split	ATMS06
Need DMS on I-40 before the US 45 exit	ATMS06
City of Jackson Police Department portable speed detection with data collection capabilities	ATMS01
Public Transportation Management	
Jackson Transit Authority SmartBus technology	APTS1 APTS2 APTS8
Jackson Transit Authority real-time bus arrival information at the transit center and bus shelters	APTS8
Jackson Transit Authority electronic fare collection	APTS4
Jackson Transit Authority CCTV cameras on buses for local recording only	APTS5
Emergency Management	
City of Jackson additional emergency vehicle traffic signal preemption	ATMS03 EM02
Need communications connections to the City of Jackson Emergency Management Agency (EMA) to share video feeds from the TDOT TMC and City of Jackson TOC	EM08
Need communications connections to the Madison County Public Safety Answering Point (PSAP) to share video feeds from the TDOT TMC and City of Jackson TOC	EM01 EM08
Maintenance and Construction Management	
City of Jackson Portable DMS for traffic information dissemination concerning roadway maintenance	MC08
Need AVL for City of Jackson Street Department vehicles	MC01
Archived Data Management	
Need the ability to archive real-time traffic count information for the City of Jackson	AD1
Need transportation data archive for the Jackson Area MPO to store transit and traffic information for use in planning	AD2

3.5 Architecture Interfaces

While it is important to identify the various systems and stakeholders as part of a regional ITS, a primary purpose of the architecture is to identify the connectivity between transportation systems in the Jackson Region. The system interconnect diagram shown previously in **Figure 4** showed the high-level relationships of the subsystems and terminators in the Jackson Region and the associated local projects and systems. The customized market packages represent services that can be deployed as an integrated capability and the market package diagrams show the information flows between the subsystems and terminators that are most important to the operation of the market packages. How these systems interface with each other is an integral part of the overall ITS architecture.

3.5.1 Element Connections

There are a large number of different elements identified as part of the Jackson Regional ITS Architecture. These elements include traffic management centers, transit vehicles, dispatch systems, emergency management agencies, media outlets, and others—essentially, all of the existing and planned physical components that contribute to the regional ITS. Interfaces have been identified for each element in the Jackson Regional ITS Architecture and each element has been mapped to those other elements with which it must interface. The Turbo Architecture software can generate interconnect diagrams for each element in the Region that show which elements are connected to one another. **Figure 6** is an example of an interconnect diagram from the Turbo database output. This particular interconnect diagram is for the City of Jackson Traffic Signals.

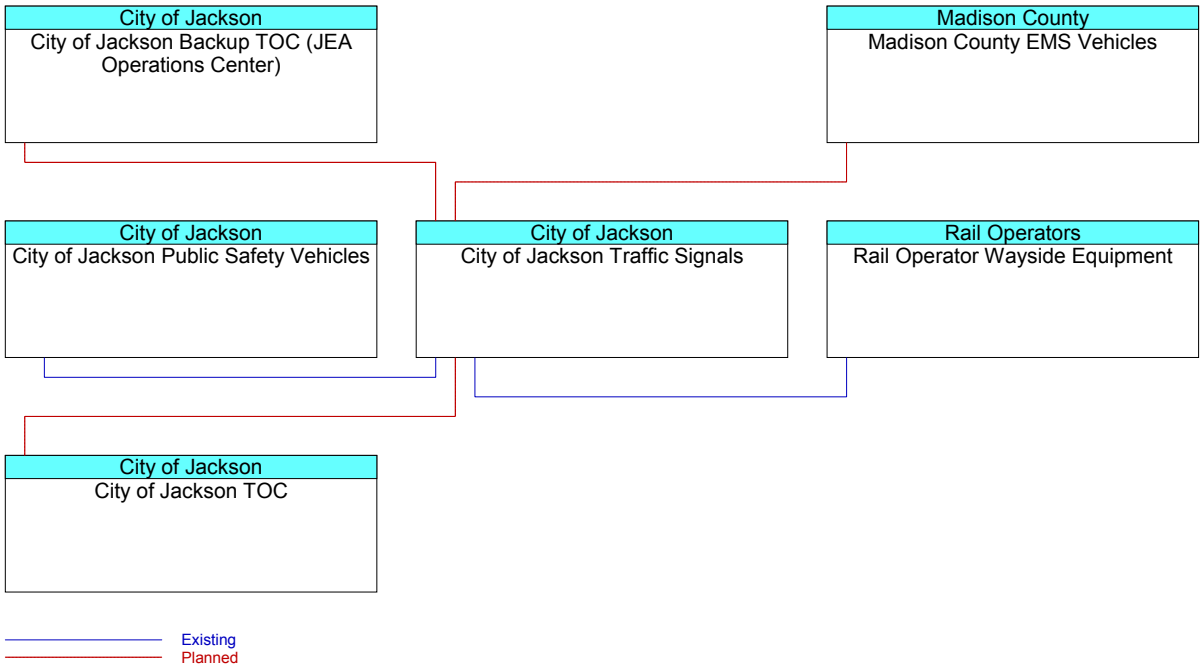

Figure 6 – Example Interconnect Diagram: City of Jackson Traffic Signals

3.5.2 Data Flows Between Elements

In the market package diagrams, flows between the subsystems and terminators define the specific information (data) that is exchanged between the elements and the direction of the exchange. The data flows could be requests for information, alerts and messages, status requests, broadcast advisories, event messages, confirmations, electronic credentials, and other key information requirements. Turbo Architecture can be used to output flow diagrams and can be filtered by market package for ease of interpretation; however, it is important to remember that custom data flows will not show up in diagrams that are filtered by market package. An example of a flow diagram for the Jackson Transit Authority that has been filtered for APTS2 – Transit Fixed Route Operations is shown in **Figure 7**.

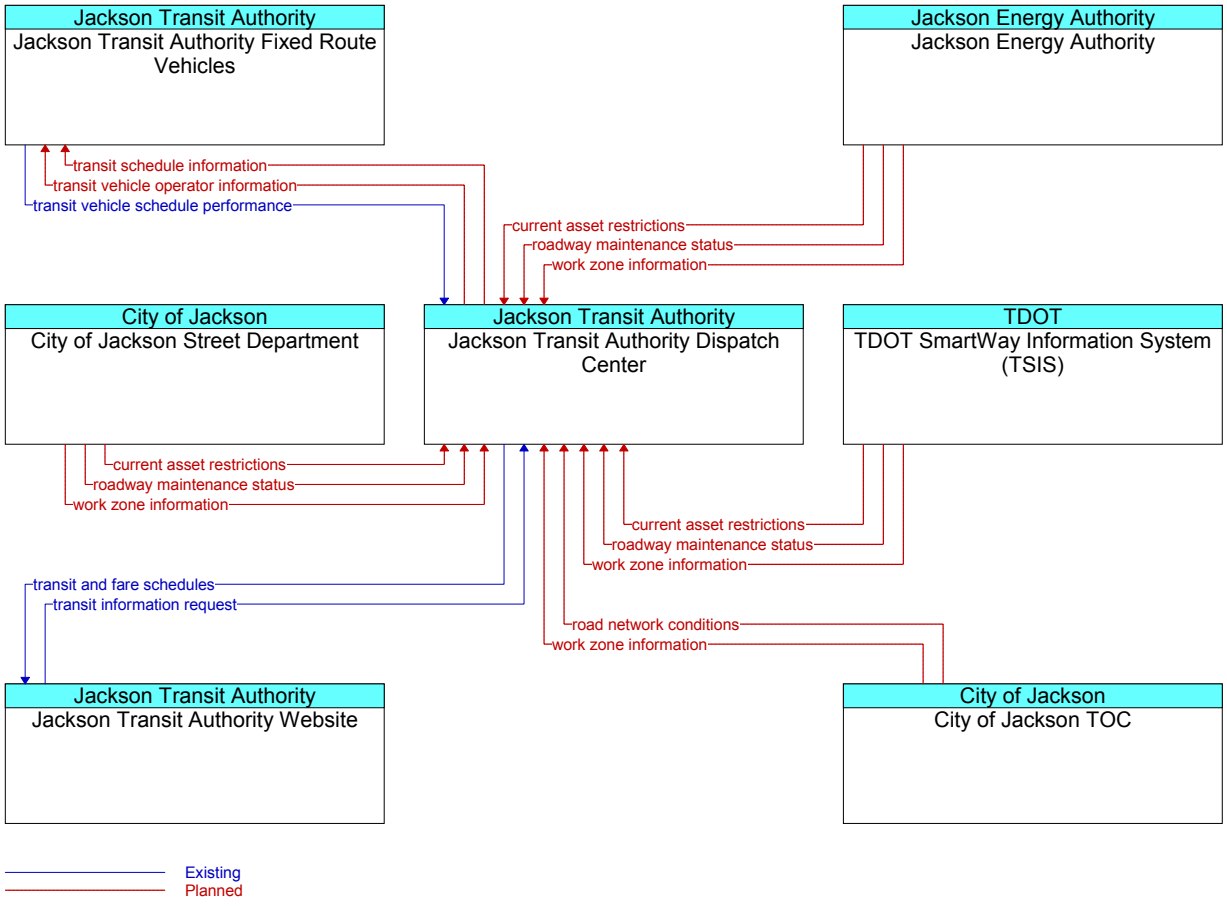

Figure 7 – Example Flow Diagram: APTS2 – Transit Fixed Route Operations

4. APPLICATION OF THE REGIONAL ITS ARCHITECTURE

Once a region has identified the desired components of ITS for their area and established which agencies and systems need to be connected, the structure of the National ITS Architecture assists with the region's planning and implementation. This section addresses the application of the Regional ITS Architecture in the Jackson Region. The National ITS Architecture provides recommendations for standards and functional requirements that should be considered when implementing ITS elements. In addition, an operational concept has been developed for the Region and documents the roles and responsibilities of stakeholders in the operation of the regional ITS. The implementation of ITS in the Jackson Region will likely require interagency agreements. Potential agreements have been identified based on the desired data flows identified in the Jackson Region. The ITS Architecture and ITS Deployment Plan developed as part of this process will be incorporated into the existing planning process for the Region to ensure that the maximum benefit is realized from the development effort.

4.1 Functional Requirements

Functions are a description of what the system has to do. In the National ITS Architecture, functions are defined at several different levels, ranging from general subsystem descriptions through somewhat more specific equipment package descriptions to Process Specifications that include substantial detail. Guidance from the USDOT on developing a Regional ITS Architecture recommends that each Region determine the level of detail of the functional requirements for their Region. In the Jackson Region, it is recommended that the development of detailed functional requirements such as the "shall" statements included in Process Specifications for a system be developed at the project level. These detailed "shall" statements identify all functions that a project or system need to perform.

For the Jackson Regional ITS Architecture, functional requirements have been identified at two levels. The customized market packages, discussed previously in Section 3.4.2, describe the services that ITS needs to provide in the Region and the architecture flows between the elements. These market packages and data flows describe what the ITS system in the Jackson Region have to do and the data that needs to be shared among elements.

At a more detailed level, functional requirements for the Jackson Region are described in terms of functions that each element in the architecture performs or will perform in the future. **Appendix C** contains a table that summarizes the functions by element.

4.2 Standards

Standards are an important tool that will allow efficient implementation of the elements in the Jackson Regional ITS Architecture over time. Standards facilitate deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances, vendors change, and as new approaches evolve. The USDOT's ITS Joint Program Office is supporting Standards Development Organizations (SDOs) with an extensive, multi-year program of accelerated, consensus-based standards development to facilitate successful ITS deployment in the United States. **Table 6** identifies each of the ITS standards that could apply to the Jackson Regional ITS Architecture. These standards are based on the physical subsystem architecture flows previously identified in Section 3.5.2.

Table 6 – Jackson Region Applicable ITS Standards

SDO	Document ID	Title
AASHTO/ITE/NEMA	NTCIP 1101	Simple Transportation Management Framework (STMF)
	NTCIP 1102	Octet Encoding Rules Base Protocol
	NTCIP 1103	Transportation Management Protocols
	NTCIP 1104	Center-to-Center Naming Convention Specification
	NTCIP 1105	CORBA Security Service Specification
	NTCIP 1106	CORBA Near-Real Time Data Service Specification
	NTCIP 1201	Global Object Definitions
	NTCIP 1202	Object Definitions for Actuated Traffic Signal Controller Units
	NTCIP 1203	Object Definitions for DMS
	NTCIP 1204	Environmental Sensor Station Interface Standard
	NTCIP 1205	Object Definitions for CCTV Camera Control
	NTCIP 1208	Object Definitions for CCTV Switching
	NTCIP 1209	Data Element Definitions for Transportation Sensor Systems
	NTCIP 1210	Field Management Stations – Part 1: Object Definitions for Signal System Masters
	NTCIP 1211	Object Definitions for Signal Control and Prioritization
	NTCIP 1401	TCIP Common Public Transportation Objects
	NTCIP 1402	TCIP Incident Management Objects
	NTCIP 1403	TCIP Passenger Information Objects
	NTCIP 1404	TCIP Scheduling/Runcutting Objects
	NTCIP 1405	TCIP Spatial Representation Objects
	NTCIP 1406	TCIP On-Board Objects
	NTCIP 1407	TCIP Control Center Objects
	NTCIP 1408	TCIP Fare Collection Business Area Objects
	NTCIP 2101	Point to Multi-Point Protocol Using RS-232 Subnetwork Profile
	NTCIP 2102	Point to Multi-Point Protocol Using Frequency Shift Keying Modem Subnetwork Profile
	NTCIP 2103	Point-to-Point Protocol Over RS-232 Subnetwork Profile
	NTCIP 2104	Ethernet Subnetwork Profile
	NTCIP 2201	Transportation Transport Profile
	NTCIP 2202	Internet (TCP/IP and UDP/IP) Transport Profile
	NTCIP 2301	STMF Application Profile
	NTCIP 2302	Trivial File Transfer Protocol Application Profile
	NTCIP 2303	File Transfer Protocol Application Profile
	NTCIP 2304	Application Profile for DATEX-ASN (AP-DATEX)
	NTCIP 2305	Application Profile for CORBA (AP-CORBA)
	NTCIP 2306	Application Profile for XML Message Encoding and Transport in ITS Center-to-Center Communications
	NTCIP 2501	Information Profile for DATEX
	NTCIP 2502	Information Profile for CORBA

Table 6 – Jackson Region Applicable ITS Standards (continued)

SDO	Document ID	Title
ASTM	ASTM E2158-01	Standard Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz Band
	ASTM E2259-xx	Standard Specification for Metadata to Support Archived Data Management Systems
	ASTM E2259-yy	Standard Specification for Archiving ITS Generated Travel Monitoring Data
	ASTM PS 105-99	Standard Provisional Specification for DSRC Data Link Layer
IEEE	IEEE 1512.1-2003	Standard for Traffic Incident Management Message Sets for Use by EOCs
	IEEE 1512.2-2004	Standard for Public Safety Incident Management Message Sets (IMMS) for use by EOCs
	IEEE 1512.3-2002	Standard for Hazardous Material IMMS
	IEEE 1512-2000	Standard for Common IMMS for use by EOCs
	IEEE 1570-2002	Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection
	IEEE 1609.1	Resource Manager for DSRC 5.9 GHz
	IEEE 1609.2	Application Services (Layers 6,7) for DSRC 5.9 GHz
	IEEE 1609.3	Communications Services (Layers 4,5) for DSRC 5.9 GHz (Future Standard)
	IEEE 1609.4	Medium Access Control (MAC) Extension and the MAC Extension Management Entity for DSRC 5.9 GHz
	IEEE 802.11	Standard Specification for Telecommunications and Information Exchange Between Roadside and Vehicle Systems – 5 GHz Band DSRC MAC and Physical Layer Specifications
	IEEE 802.2	Logical Link (Layer 2) for DSRC 5.9 GHz
	IEEE P1512.4	Standard for Common Traffic Incident Management Message Sets for Use in Entities External to Centers
ISO	ISO 21210	Networking Services (Layer 3) for DSRC 5.9 GHz
SAE	ITE TM 1.03	Standard for Functional Level Traffic Management Data Dictionary
	ITE TM 2.01	Message Sets for External TMC Communication
	SAE J2266	Location Referencing Message Specification
	SAE J2354	Message Set for Advanced Traveler Information System (ATIS)
	SAE J2369	Standard for ATIS Message Sets Delivered Over Reduced Bandwidth Media
	SAE J2540	Messages for Handling Strings and Look-Up Tables in ATIS Standards
	SAE J2540-1	Radio Data System Phrase Lists
	SAE J2540-2	International Traveler Information Systems Phrase Lists
	SAE J2540-3	National Names Phrase List

4.3 Operational Concepts

An operational concept documents each stakeholder's current and future roles and responsibilities across a range of transportation services, as grouped in the Operational Concepts section of Turbo Architecture, in the operation of the regional ITS The services covered are:

- ***Arterial Management*** – The development of signal systems that react to changing traffic conditions and provide coordinated intersection timing over a corridor, an area, or multiple jurisdictions.
- ***Highway Management*** – The development of systems to monitor freeway (or tollway) traffic flow and roadway conditions, and provide strategies such as ramp metering or lane access control to improve the flow of traffic on the freeway. Includes systems to provide information to travelers on the roadway.
- ***Incident Management*** – The development of systems to provide rapid and effective response to incidents. Includes systems to detect and verify incidents, along with coordinated agency response to the incidents.
- ***Emergency Management*** – The development of systems to provide emergency call taking, public safety dispatch, and emergency operations center operations.
- ***Maintenance and Construction Management*** – The development of systems to manage the maintenance of roadways in the Region, including winter snow and ice clearance. Includes the managing of construction operations.
- ***Transit Management*** – The development of systems to more efficiently manage fleets of transit vehicles or transit rail. Includes systems to provide transit traveler information both pre-trip and during the trip.
- ***Electronic Payment*** – The development of electronic fare payment systems for use by transit and other agencies (e.g., parking).
- ***Commercial Vehicle Operations*** – The development of systems to facilitate the management of commercial vehicles (e.g., electronic clearance).
- ***Traveler Information*** – The development of systems to provide static and real time transportation information to travelers.
- ***Archived Data Management*** – The development of systems to collect transportation data for use in non-operational purposes (e.g., planning and research).

Table 7 identifies the roles and responsibilities of key stakeholders for a range of transportation services.

Table 7 – Jackson Region Stakeholder Roles and Responsibilities

Transportation Service	Stakeholder	Roles/Responsibilities
Arterial Management	City of Jackson	Operate and maintain traffic signal systems within the City.
		Operate network surveillance equipment including CCTV cameras and vehicle detection on roadways within the City to facilitate traffic signal operations.
		Remotely operate traffic signal controllers to implement traffic management strategies at signalized intersections based on traffic conditions, incidents, and emergency vehicle preemptions.
		Provide traffic signal preemption for emergency vehicles.
	Municipal Government	Operate and maintain traffic signal systems within the municipality.
		Operate network surveillance equipment including CCTV cameras and vehicle detection on roadways within the municipality to facilitate traffic signal operations.
		Remotely operate traffic signal controllers to implement traffic management strategies at signalized intersection based on traffic conditions, incidents, and emergency vehicle preemptions.
Highway Management	TDOT	Operate DMS and HAR for the distribution of traffic information and roadway conditions to travelers on the roadway.
		Operate network surveillance equipment including CCTV cameras and vehicle detection on state roadways.
		Operate motorist assistance patrol (HELP) to facilitate special event traffic control and incident management.
Incident Management (Traffic)	City of Jackson	Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for the dissemination of traffic related data to other centers and the media.
		Operate DMS for the distribution of incident information to travelers on the roadway.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.
		Coordinate maintenance resources for incident response with the City of Jackson Street Department.
	TDOT	Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for the dissemination of traffic related data to other centers and the media.
		Operate DMS and HAR for the distribution of incident information to travelers on the roadway.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.

Table 7 – Jackson Region Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Incident Management (Traffic) (continued)	TDOT (continued)	Responsible for the development, coordination, and execution of special traffic management strategies during an evacuation.
Incident Management (Emergency)	City of Jackson Police Central Dispatch	Dispatch public safety vehicles for incidents.
		Coordinate incident response with other public safety agencies, the City of Jackson TOC, and the TDOT SmartWay Center in Memphis for incidents on state facilities.
	Madison County E911 Dispatch	Responsible for emergency call-taking for Madison County, including the City of Jackson, as the 911 PSAP.
		Coordinate incident response with other public safety agencies, the City of Jackson TOC, and the TDOT SmartWay Center in Memphis for incidents on state facilities.
	Madison County EMS Dispatch	Dispatch public safety vehicles for incidents.
		Coordinate incident response with other public safety agencies, the City of Jackson TOC, and the TDOT SmartWay Center in Memphis for incidents on state facilities.
	Madison County Fire Dispatch	Dispatch public safety vehicles for incidents.
		Coordinate incident response with other public safety agencies, the City of Jackson TOC, and the TDOT SmartWay Center in Memphis for incidents on state facilities.
	Madison County Sheriff Dispatch	Dispatch public safety vehicles for incidents.
		Coordinate incident response with other public safety agencies, the City of Jackson TOC, and the TDOT SmartWay Center in Memphis for incidents on state facilities.
	Municipal Public Safety Dispatch	Dispatch public safety vehicles for incidents.
		Coordinate incident response with other public safety agencies as well as the TDOT SmartWay Center in Memphis for incidents on state facilities.
	THP Dispatch	Dispatch public safety vehicles for incidents.
		Coordinate incident response with other public safety and traffic management agencies as well as the TDOT SmartWay Center in Memphis for incidents on state facilities.
Emergency Management	City of Jackson Central Dispatch	Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		Participate in regional emergency planning to support large-scale incidents and disasters.

Table 7 – Jackson Region Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	City of Jackson Central Dispatch (continued)	Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Madison County 911 PSAP	Responsible for emergency call-taking for Madison County, including the City of Jackson, as the 911 PSAP.
		Participate in regional emergency planning to support large-scale incidents and disasters.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Madison County EMS Dispatch	Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		Participate in regional emergency planning to support large-scale incidents and disasters.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Madison County Fire Dispatch	Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		Participate in regional emergency planning to support large-scale incidents and disasters.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Madison County Sheriff Dispatch	Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		Participate in regional emergency planning to support large-scale incidents and disasters.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Jackson/Madison County EMA	Operates the EOC for Madison County including the City of Jackson in the event of a disaster or other large-scale emergency situation.
		Responsible for tactical decision support, resource coordination, and communications integration among emergency management agencies in the County.
		Lead regional efforts for emergency planning to support large-scale incidents and disasters.

Table 7 – Jackson Region Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	Jackson/Madison County EMA (continued)	Lead evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Municipal Public Safety Dispatch	Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		Participate in regional emergency planning to support large-scale incidents and disasters.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	TEMA	Operates the EOC for the State of Tennessee in the event of a disaster or other large-scale emergency situation.
		Responsible for tactical decision support, resource coordination, and communications integration among emergency management agencies in the State.
		Lead statewide efforts for emergency planning to support large-scale incidents and disasters.
		Lead evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	THP Dispatch	Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		Participate in regional emergency planning to support large-scale incidents and disasters.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Tennessee Bureau of Investigation	Responsible for the initiation of AMBER Alerts.
Maintenance and Construction Management	City of Jackson Street Department	Responsible for the tracking and dispatch of maintenance vehicles.
		Supports coordinated response to incidents.
		Supports work zone activities including the dissemination of work zone information through portable DMS and sharing of information with other groups.
		Disseminates work zone activity schedules and current asset restrictions to other agencies.

Table 7 – Jackson Region Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Maintenance and Construction Management (continued)	Madison County Highway Department	Supports coordinated response to incidents.
		Supports work zone activities including the dissemination of work zone information through portable DMS and sharing of information with other groups.
		Disseminates work zone activity schedules and current asset restrictions to other agencies.
	TDOT	Monitors environmental sensors and distributes information about road weather conditions.
		Responsible for the tracking and dispatch of maintenance vehicles.
		Supports coordinated response to incidents.
		Supports work zone activities including the dissemination of work zone information through portable DMS, HAR, and sharing of information with other groups.
		Disseminates work activity schedules and current asset restrictions to other agencies.
		Operates work zone traffic control equipment including portable surveillance equipment, DMS, and HAR transmitters.
Transit Management	Jackson Transit Authority	Operates fixed route and paratransit services from a central dispatch facility responsible for tracking their location and status.
		Provide transit passenger electronic fare payment on fixed route and demand response transit vehicles.
		Provide transit security on transit vehicles and at transit terminals through silent alarms and surveillance systems.
		Coordinate transit service with other regional transit providers.
		Provide schedule and fare information on transit kiosks.
		Provide transit traveler information to the agency website, local private sector traveler information services, and the Tennessee 511 system.
		Operate on-board systems to provide next stop annunciation.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Southwest HRA Transportation	Operates demand response transit services from a central dispatch facility responsible for tracking their location and status.
		Provide transit passenger electronic fare payment on demand response transit vehicles.
		Provide transit security on transit vehicles through silent alarms and surveillance systems.
		Coordinate transit service with other regional transit providers.

Table 7 – Jackson Region Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Transit Management (continued)	Southwest HRA Transportation (continued)	Provide transit traveler information to the agency website, local private sector traveler information services, and the Tennessee 511 system.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
Traveler Information	City of Jackson	Responsible for the collection and distribution of traveler information including incident information and maintenance and construction closure information.
		Responsible for the collection and distribution of emergency information to the traveling public, including evacuation information and wide-area alerts.
	TDOT	Collection, processing, storage, and broadcast dissemination of traffic, transit, maintenance and construction, event and weather information to travelers via the 511 Traveler Information System.
		Provide transportation information to travelers via traveler information kiosks.
Archived Data Management	Jackson Area MPO	Collect and maintain data from regional traffic and transit management agencies.

4.4 Potential Agreements

The Regional ITS Architecture for the Jackson Region has identified many agency interfaces, information exchanges, and integration strategies that would be needed to provide the ITS services and systems identified by the stakeholders in the Region. Interfaces and data flows among public and private entities in the Region will require agreements among agencies that establish parameters for sharing agency information to support traffic management, incident management, provide traveler information, and perform other functions identified in the Regional ITS Architecture.

With the implementation of ITS technologies, integrating systems from one or more agencies, and the anticipated level of information exchange identified in the architecture, it is likely that formal agreements between agencies will be needed in the future. These agreements, while perhaps not requiring a financial commitment from agencies in the Region, should outline specific roles, responsibilities, data exchanges, levels of authority, and other facets of regional operations. Some agreements will also outline specific funding responsibilities, where appropriate and applicable.

Agreements should avoid being specific with regards to technology when possible. Technology is likely to change rapidly and changes to technology could require an update of the agreement if the agreement was not technology neutral. Focus of the agreement should be on the responsibilities of the agencies and the high level information that needs to be exchanged. Depending on the type of agreement being used, agencies should be prepared for the process to complete an agreement to take several months to years. Agencies must first reach consensus on what should be in an agreement and then proceed through the approval process. The approval process for formal agreements varies by agency and can often be quite lengthy, so it is recommended that agencies plan ahead to ensure that the agreement does not delay the project.

When implementing an agreement for ITS, it is recommended that as a first step any existing agreements are reviewed to determine whether they can be amended or modified to include the additional requirements that will come with deploying a system. If there are no existing agreements that can be modified or used for ITS implementation, then a new agreement will need to be developed. The formality and type of agreement used is a key consideration. If the arrangement will be in affect for an extended duration or involve any sort of long term maintenance, then written agreements should be used. Often during long term operations, staff may change and a verbal agreement between agency representatives may be forgotten by new staff.

Common agreement types and potential applications include

- Handshake Agreement: Handshake agreements are often used in the early stage of a project. This type of informal agreement depends very much on relationships between agencies and may not be appropriate for long term operations where staff is likely to change.
- Memorandum of Understanding (MOU): A MOU demonstrates general consensus but is not typically very detailed.
- Interagency and Intergovernmental Agreements: These agreements between public agencies can be used for operation, maintenance, or funding of its projects and systems. They can include documentation on the responsibility of each agency, functions they will provide, and liability.
- Funding Agreements: Funding agreements document the funding arrangements for ITS projects. At a minimum, funding agreements include a detailed scope, services to be performed, and a detailed project budget.
- Master Agreements: Master agreements include standard contract language for an agency and serve as the main agreement between two entities which guides all business transactions. Use of a master agreement can allow an agency to do business with another agency or private entity without having to go through the often lengthy development of a formal agreement each time.

Table 8 provides a list of existing and potential agreements for the Jackson Region based on the interfaces identified in the Regional ITS Architecture. It is important to note that as ITS services and systems are implemented in the Region, part of the planning and review process for those projects should include a review of potential agreements that would be needed for implementation or operations.

Table 8 – Jackson Region Existing and Potential Agreements

Status	Agreement and Agencies	Agreement Description
Future	**Data Sharing and Usage (Public-Private)** – (TDOT, City of Jackson, media)	Agreement would allow private sector media and information service providers to access and broadcast public transportation agency CCTV camera video feeds, real time traffic speed and volume data, and incident data. Agreements should specify the control priority to allow traffic agencies first priority to control cameras during incidents or other events. The ability of the traffic agency to deny access to video and data feeds if a situation warrants such action should also be part of the agreement.
Future	**Data Sharing and Usage (Public-Public)** – (TDOT, City of Jackson)	Agreement would define the parameters, guidelines, and policies for inter-agency ITS data sharing between the public sector agencies. Similar to data sharing and usage agreements for public-private agencies, the agency that owns the equipment should have first priority of the equipment and the ability to discontinue data sharing if a situation warrants such action.
Future	**ITS and Traffic Signal Timing Data Sharing and Usage** – (City of Jackson, Municipalities/Counties)	Agreement would define the parameters, guidelines, and policies for inter-agency ITS and traffic signal timing sharing between cities, counties, and any other agencies that might maintain their traffic signal system.
Future	**Incident Data Sharing and Usage** – (TDOT, City of Jackson, THP, Madison County 911 PSAP, Madison County Public Safety Agencies)	Agreement would define the parameters, guidelines, and policies for inter-agency sharing of incident data between transportation and emergency management agencies in the Region. Incident information could be sent directly to computer-aided dispatch systems and include information on lane closures, travel delays, and weather.
Future	**Joint Operations Agreements –** (TDOT, City of Jackson, Madison County)	Agreement to operate the system from a shared control facility that could include traffic, transit, and emergency management. Examples could include a regional TMC or a combined TMC and EOC. Agreement will need to identify such issues as sharing of data and control of devices, cost sharing of the facilities, and standard operating procedures. Shared field equipment, such as a CCTV camera that can be accessed by multiple agencies could also be covered under this type of agreement.
Future	**Maintenance Agreements** – (TDOT, City of Jackson)	Agreement that would allow multiple public agencies to pool their funding together to hire a single maintenance contractor to maintain ITS devices throughout the Region.

4.5 Phases of Implementation

The Regional ITS Architecture will be implemented over time through a series of projects led by both public sector and private sector agencies. Key foundation systems will need to be implemented in order to support other systems that have been identified in the Regional ITS Architecture. The deployment of all of the systems required to achieve the final Regional ITS Architecture build out will occur over many years.

A sequence of projects and their respective time frames have been identified in the Jackson Regional ITS Deployment Plan. These projects have been sequenced over a 20-year period, with projects identified for deployment in 5-, 10- and 20-year timeframes.

Some of the key market packages that will provide the functions for the foundation systems in the Jackson Region are listed below. Projects associated with these and other market packages identified for the Region have been included in the Jackson Regional ITS Deployment Plan.

- Network Surveillance;
- Surface Street Control;
- Traffic Information Dissemination; and
- Transit Vehicle Tracking.

4.6 Incorporation into the Regional Planning Process

Stakeholders invested a considerable amount of effort in the development of the Regional ITS Architecture and Regional ITS Deployment Plan for the Jackson Region. The plans need to be incorporated into the regional planning process so that the ITS vision for the Region is considered when implementing ITS projects and to ensure that the Region remains eligible for federal funding for implementation of the projects.

As projects are added to the Transportation Improvement Program (TIP) each project should be evaluated to determine if the project includes any ITS elements. If the project contains an ITS element, then the Regional ITS Architecture needs to be reviewed to ensure that the project is in conformance. The Jackson Area MPO will perform this examination as part of the planning process using the procedure outlined in Section 4.6.1.

4.6.1 Process for Determining Architecture Conformity

The Jackson Regional ITS Architecture documents the customized market packages that were developed as part of the ITS architecture process. To satisfy federal requirements and remain eligible to use federal funds, a project must be accurately documented. The steps of the process are as follows:

- Identify the ITS components in the project;
- Identify the corresponding market packages(s) from the Regional ITS Architecture;
- Locate the component within the market package;
- Compare the connections to other agencies or elements documented in the ITS architecture as well as the information flows between them to the connections that will be part of the project; and
- Document any changes necessary to the ITS Architecture or the project to ensure there is conformance.

Identifying the ITS Components

ITS components can be fairly apparent in an ITS focused project such as CCTV or DMS deployments but could also be included in other types of projects. For example, an arterial widening project could include the installation of signal system interconnect, signal upgrades, and the incorporation of the signals in the project limits into the City's closed loop signal system. These are all ITS deployments and should be included in the ITS architecture.

Identifying the Corresponding Market Packages

If a project was included in **Table 8 through Table 12** of the ITS Deployment Plan, then the applicable market package(s) for that project are identified in a column of the table. However, ITS projects are not required to be included in the ITS Deployment Plan in order to be eligible for federal funding; therefore, market packages might need to be identified without the assistance of an ITS Deployment Plan. In that case, the market packages selected and customized for the Jackson Region are identified in **Table 4** of this document and detailed market package definitions are located in **Appendix A**.

Identifying the Component within the Market Package

The customized market packages for the Jackson Region are located in **Appendix B**. Once the element is located on the market package, the evaluator may determine that the element name should be modified. For example, an element called the City of Jackson TOC was included in the architecture, but at the time of deployment, the City might decide to call the center by a new name. This name change should be documented using the process outlined in Section 5.2.

Evaluating the Connections and Flows

The connections and architecture flows documented in the market package diagrams were selected based on the information available at the time the plan was developed. As the projects are designed, decisions will be made on the system layout that might differ from what is shown in the market package. These changes in the project should be documented in the ITS market packages using the process outlined in Section 5.2.

Documenting Required Changes

If any changes are needed to accommodate the project under review, Section 5.2 describes how those changes should be documented. Any changes will be incorporated during the next architecture update. Conformance will be accomplished by documenting how the market package(s) should be modified so that the connections and data flows are consistent with the project.

5. MAINTAINING THE REGIONAL ITS ARCHITECTURE

The ITS Architecture developed for the Jackson Region addresses the Region's vision for ITS implementation at the time the plan was developed. With the growth of the Region, needs will change and as technology progresses new ITS opportunities will arise. For example, at the time this architecture was developed the City of Medon did not control their own traffic signals, Madison County operated and maintained them through an interlocal agreement. As more development occurs in the Region, Medon may at some point operate its own signal system. Shifts in regional needs and focus as well as changes in the National ITS Architecture will necessitate that the Jackson Regional ITS Architecture be updated to remain a useful resource for the Region.

5.1 Maintenance Process

The Jackson Area MPO will be responsible for leading the process to update the Jackson Regional ITS Architecture and Deployment Plan in coordination with the TDOT Long Range Planning Division. **Table 9** summarizes the maintenance process agreed upon by stakeholders in the Region.

Table 9 – Regional ITS Architecture and Deployment Plan Maintenance Summary

Maintenance Details	Regional ITS Architecture		Regional ITS Deployment Plan	
	Minor Update	**Major Update**	**Minor Update**	**Major Update**
Timeframe for Updates	As needed	Every 4 years	Annually	Every 4 years
Scope of Update	Update market packages to satisfy architecture compliance requirements of projects or to document other changes that impact the ITS Architecture	Entire ITS Architecture	Update project status and add or remove projects as needed	Entire ITS Deployment Plan
Lead Agency	Jackson Area MPO		Jackson Area MPO	
Participants	Stakeholders impacted by market package modifications	Entire stakeholder group	Entire stakeholder group	
Results	Market package or other change(s) documented for next complete update	Updated Jackson Regional ITS Architecture document, Appendices, and Turbo Architecture database	Updated project tables	Updated Jackson Regional ITS Deployment Plan document

Additional information on the procedure for submitting minor architecture changes is included in Section 5.2 of this document. A major update will occur every four years in the year preceding the TIP update. The next update of the Regional ITS Architecture will take place in 2010. Section 4 of the ITS Deployment Plan contains additional detail on the annual project review process.

5.2 Procedure for Submitting ITS Architecture Changes Between Major Updates

Updates to the Jackson Regional ITS Architecture will occur on a regular basis as described in Section 5.1 to maintain the architecture as a useful planning tool. Between major plan updates smaller modifications will likely be required to accommodate ITS projects in the Region. Section 4.6.1 contains step by step guidance for determining whether or not a project requires architecture modifications.

For situations where a change is required, an Architecture Maintenance Documentation Form was developed and is included in **Appendix E**. This form should be completed and submitted to the architecture maintenance contact person whenever a change to the Regional ITS Architecture is proposed. In the process of documenting the change, the stakeholder proposing the change should contact any other agency that will be impacted by the modification to obtain feedback. This communication between agencies will simplify the process of performing a major plan update. The Jackson Area MPO will review and accept the proposed changes and forward the form to the Long Range Planning Division for their records. When a major update is performed all of the documented changes will be incorporated into the architecture.