Memphis Urban Area MPO
Regional ITS Architecture Update Workshop

July 8, 2014





Memphis MPO
METROPOLITAN PLANNING ORGANIZATION
Strengthening Regional Transportation

Kimley»Horn

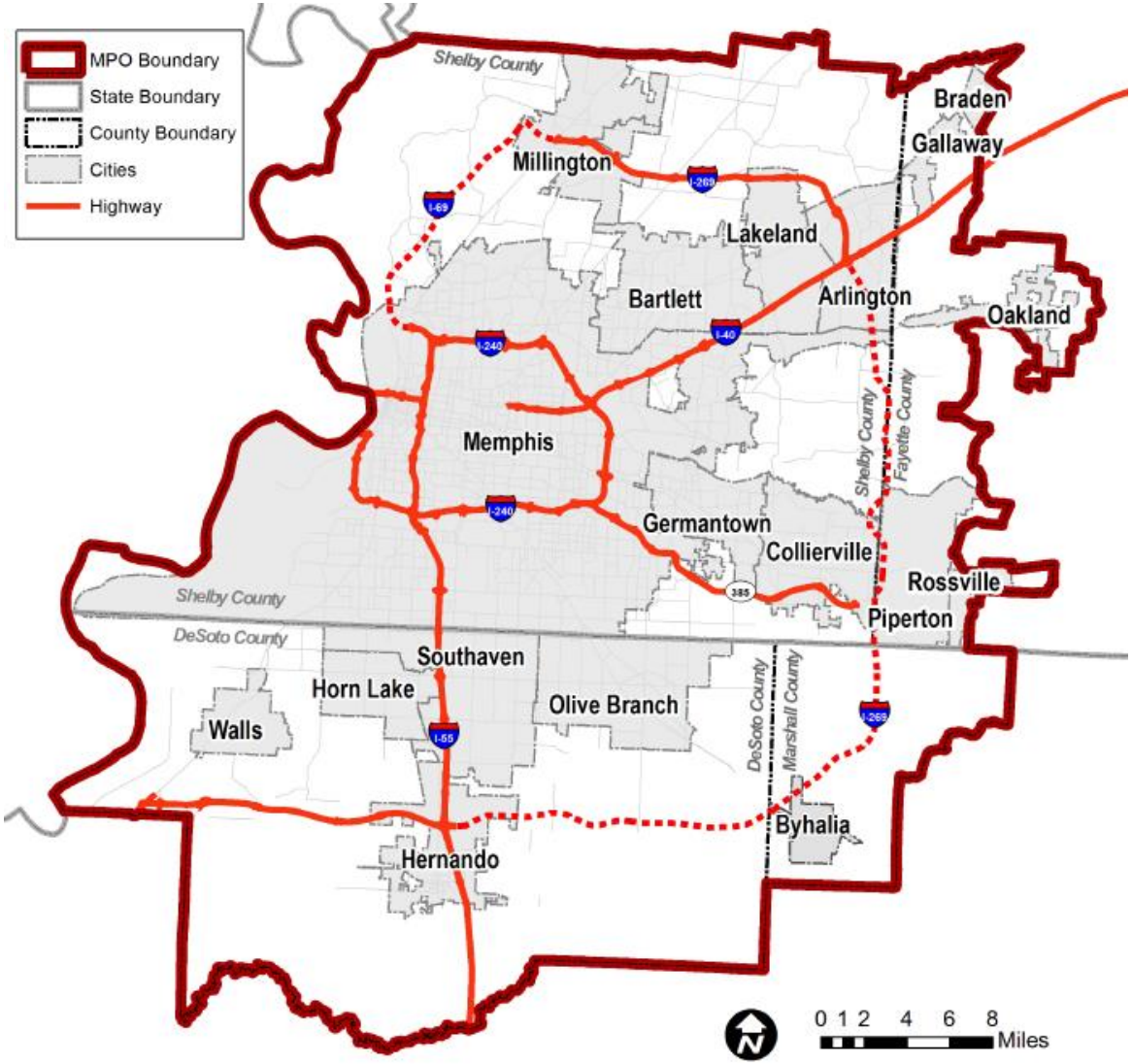
Workshop Overview

- Introductions
- Review of the Draft Regional ITS Architecture Document
- Discussion on Existing and Planned ITS Projects in the Region
- Discussion on Use and Maintenance of the Regional ITS Architecture
- Concluding Comments
- Adjourn

Project Overview

- Purpose: Update the 2010 Memphis Urban Area Regional ITS Architecture and Deployment Plan
- Update goals:
  - Include participation from traffic, transit, and public safety stakeholders representing local, state, and federal agencies in the Memphis MPO Region
  - Provide a high level plan that documents the Region's vision for the deployment, integration, and operation of ITS in the Memphis MPO Region
  - Assist the Region in meeting the FHWA and FTA requirements for ITS architecture conformity

Project Overview



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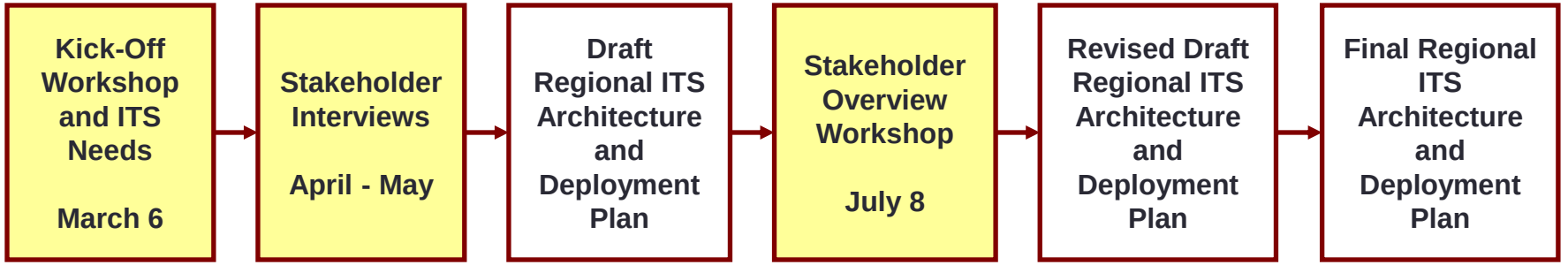


Remaining Deliverables

Revised Draft Regional ITS Architecture

Executive Summary
Final Regional ITS Architecture
Final Turbo Architecture Database

Draft Regional ITS Architecture Document

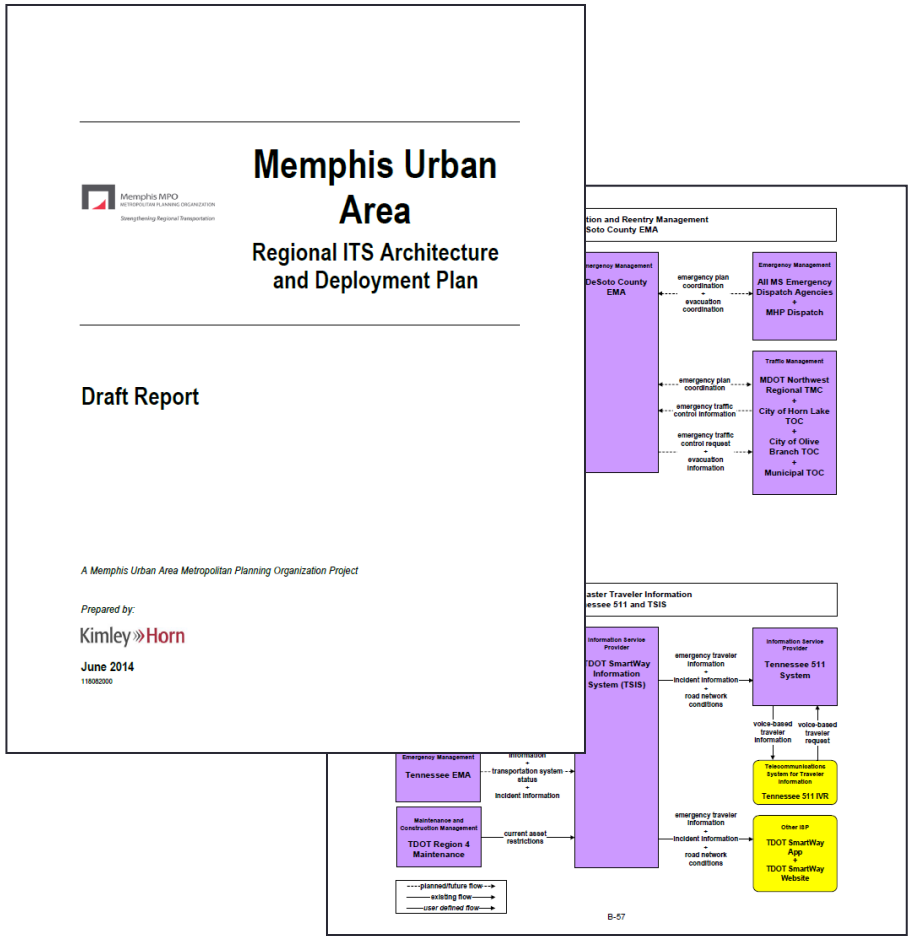
- Draft Regional ITS Architecture Document
  - Sent to stakeholders on July 1st
  - Documents updates to the Regional ITS Architecture
  - Includes regional ITS needs, ITS element inventory, ITS service packages, and use and maintenance plan
  - Section on Regional ITS Deployment Plan will be added in revised draft
- Document Review
  - Comments can be submitted to Tom Fowler or Sajid Hossain
  - Comments requested by Friday, July 18th
  - Document is currently available on project website

www.memphismpo.org/plans/safety-mobility/its

Draft Regional ITS Architecture Document

Key Sections in the Regional ITS Architecture Document

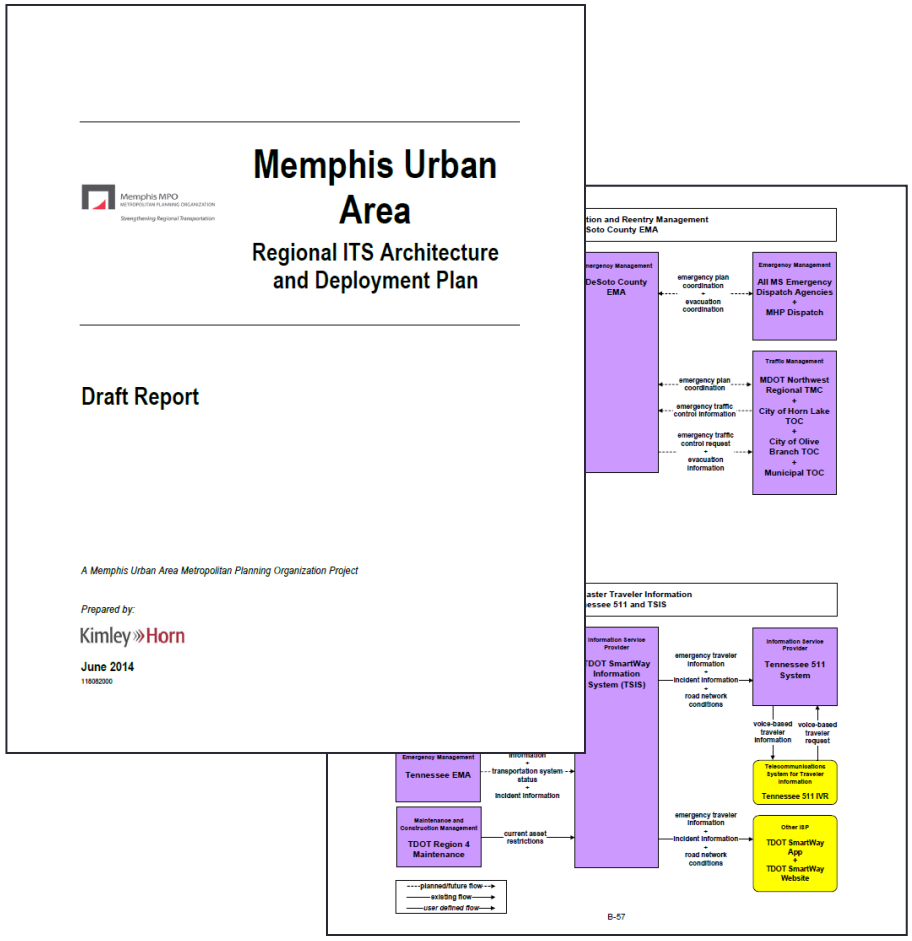
- Regional ITS Needs (Section 3, Section 5.1.4)
- Inventory of Existing and Planned Elements (Section 4)
- Selected ITS Service Packages and Regional Prioritization (Section 5)
- Customized ITS Service Package Diagrams (Appendix B)



Draft Regional ITS Architecture Document

Key Sections in the Regional ITS Architecture Document

- Regional ITS Deployment Plan (Section 6)
- Use and Maintenance Plan (Section 7)
- Architecture Maintenance Documentation Form (Appendix E)



Regional ITS Needs and Corresponding Service Packages

Regional Needs – Traffic Management and Traveler Information

ITS Need	Service Packages
Establish or improve communication and coordination among agencies for traffic operations and incident management	ATMS07 – Regional Traffic Management ATMS08 – Traffic Incident Management System
Utilize strategies for mitigating congestion and improving air quality	ATMS01 – Network Surveillance ATMS03 – Traffic Signal Control ATMS04 – Traffic Metering ATMS05 – HOV Lane Management ATMS11 – Emissions Monitoring and Management ATMS22 – Variable Speed Limits
Provide pre-trip and en-route traveler information	ATMS06 – Traffic Information Dissemination ATIS01 – Broadcast Traveler Information ATIS02 – Interactive Traveler Information

Regional Needs – Emergency Management

ITS Need	Service Packages
Implement measures to reduce the impact of large scale natural disasters	EM08 – Disaster Response and Recovery EM09 – Evacuation and reentry Management EM10 – Disaster Traveler Information
Establish or increase the coverage area of roadway patrols along interstates and arterials	EM04 – Roadway Service Patrols
Improve emergency vehicle movements with signal preemption	ATMS03 – Traffic Signal Control EM01 – Emergency Call-Taking and Dispatch EM02 – Emergency Routing
Reestablish the Traffic Incident Management group (TIM)	ATMS07 – Regional Traffic Management ATMS08 – Traffic Incident Management System

Regional Needs – Maintenance and Construction Management

ITS Need	Service Packages
Increase work zone safety for drivers and workers	MC08 – Work Zone Management MC09 – Work Zone Safety Monitoring MC10 – Maintenance and Construction Activity Coordination
Monitor roadway weather conditions to minimize the effects of adverse conditions on traffic	ATMS06 – Traffic Information Dissemination ATMS24 – Dynamic Roadway Warning MC03 – Road Weather Data Collection MC04 – Weather Information Processing and Distribution MC05 – Roadway Automated Treatment MC06 – Winter Maintenance

Regional Needs – Public Transportation Management

ITS Need	Service Packages
Expand traffic signal priority for transit vehicles	APTS09 – Transit Signal Priority ATMS03 – Traffic Signal Control
Optimize passenger travel times and establish coordination among transit agencies	APTS02 – Transit Fixed-Route Operations APTS03 – Demand Response Transit Operations APTS07 – Multi-modal Coordination APTS11 – Multi-modal Connection Protection
Develop a mobile phone application that improves trip planning and real-time transit information	APTS01 – Transit Vehicle Tracking APTS08 – Transit Traveler Information ATIS02 – Interactive Traveler Information

Potential Routes of Regional Significance

23 CFR Part 511 – Real-Time System Management Information Program

Key Components

- Collect and make accessible real-time system information along interstate and other routes of significance
- Information includes:
  - Construction Activities
  - Roadway or Lane Blocking Incidents
  - Roadway Weather Observations
  - Travel Time Information
- Agencies must ensure a certain level of accuracy and timeliness
- Information required on Interstates by November 8, 2014
- Information required on routes of significance by November 8, 2016
- Identification of routes of significance must be a collaborative effort

Routes Where Real-Time System Information is Desired

Shelby County

- Poplar Avenue (SR 57/US 72)
- Germantown Road (SR 177)
- Lamar Avenue (SR 4/US 78)
- East Parkway (SR 277/US 64/US 70/US 79)
- Union Avenue (SR 3/SR 23/US 64/US79)
- North Parkway/Summer Avenue (SR 1/US 64/US 70/US 79)
- Kirby Whitten Parkway/ Whitten Road
- Sycamore View Road
- US 64/SR 15
- Winchester Road
- E. Shelby Drive (SR 175)
- Holmes Road
- Walnut Grove Road (SR 23)
- 3rd Street (SR 14/US 61)
- Austin Peay Highway (SR14)
- Houston Levee Road
- Danny Thomas Boulevard (SR 1/US 51)
- Wolf River Boulevard

Routes Where Real-Time System Information is Desired

DeSoto County

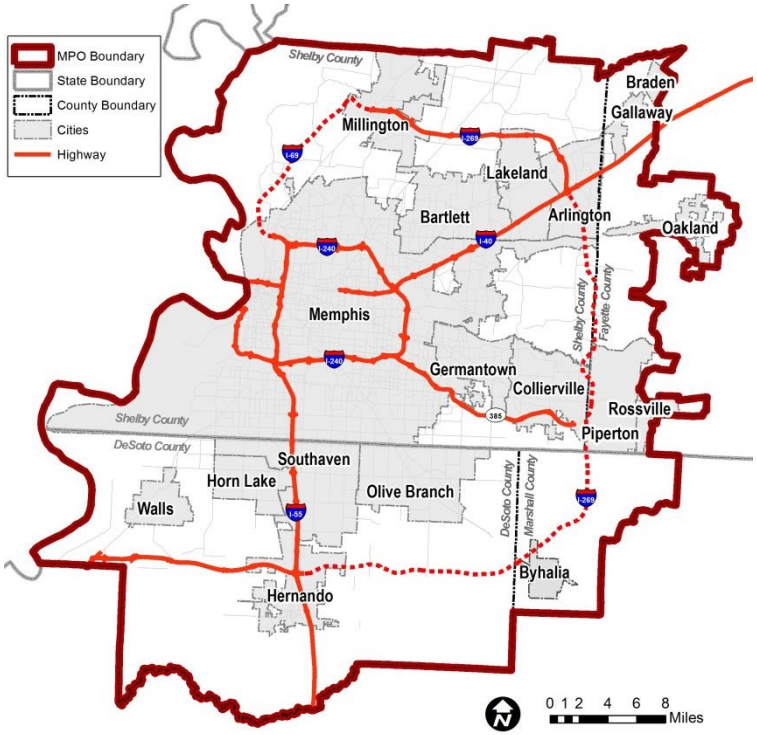
- Goodman Rd. (SR 302)
- Getwell Rd.
- Commerce St.
- Church Rd.
- Hacks Cross Rd.
- Byhalia Rd. (SR 309)
- US 51
- Airways Boulevard
- Stateline Road
- Germantown Road/ Cockrum Road (SR 305)

Marshall County

- US 78
- US 72
- SR 302

Crittenden County

- US 70
- US 64
- SR 77



Discussion on
ITS Service Package Prioritization

ITS Service Package Prioritization

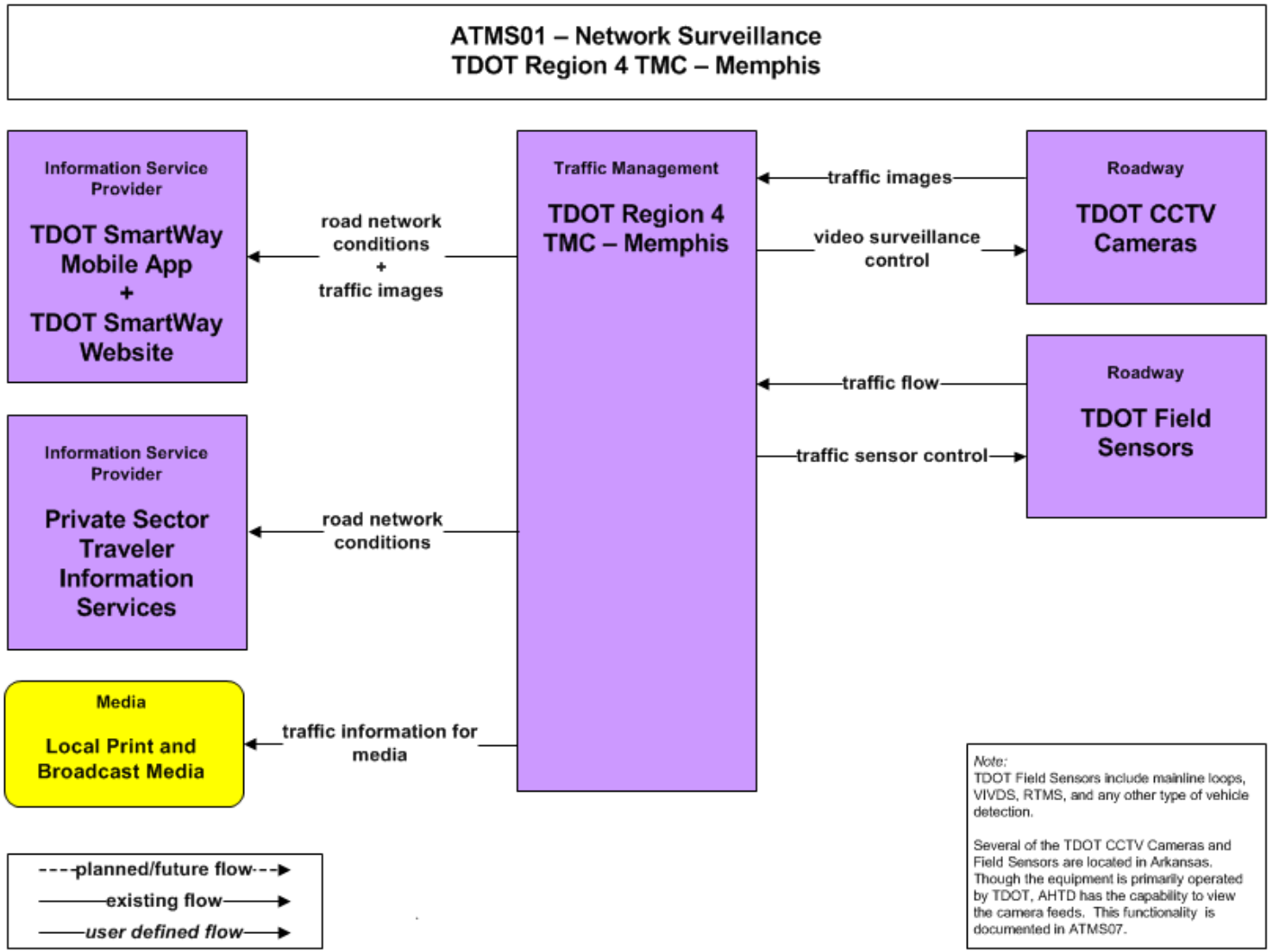
High Priority ITS Service Packages	Medium Priority ITS Service Packages	Low Priority ITS Service Packages
Traffic Management		
ATMS01 Network Surveillance	ATMS04 Traffic Metering	ATMS02 Traffic Probe Surveillance
ATMS03 Traffic Signal Control	ATMS13 Standard Railroad Grade Crossing	ATMS05 HOV Lane Management
ATMS06 Traffic Information Dissemination	ATMS16 Parking Facility Management	ATMS10 Electronic Toll Collection
ATMS07 Regional Traffic Management	ATMS17 Regional Parking Management	ATMS11 Emissions Monitoring and Management
ATMS08 Traffic Incident Management System	ATMS23 Dynamic Lane Management	ATMS19 Speed Warning and Enforcement
ATMS26 Mixed Use Warning Systems	ATMS24 Dynamic Road Warning	ATMS22 Variable Speed Limits
Emergency Management		
EM01 Emergency Call-Taking and Dispatch	EM06 Wide-Area Alert	
EM02 Emergency Routing	EM08 Disaster Response and Recovery	
EM04 Roadway Service Patrols	EM09 Evacuation and Reentry Management	
EM05 Transportation Infrastructure Protection	EM10 Disaster Traveler Information	
Maintenance and Construction Management		
MC10 Maintenance and Construction Activity Coordination	MC01 Maintenance and Construction Vehicle and Equipment Tracking	MC05 Roadway Automated Treatment
MC12 Infrastructure Monitoring	MC03 Road Weather Data Collection	MC06 Winter Maintenance
	MC04 Weather Information Processing and Distribution	
	MC08 Work Zone Management	
	MC09 Work Zone Safety Monitoring	

ITS Service Package Prioritization

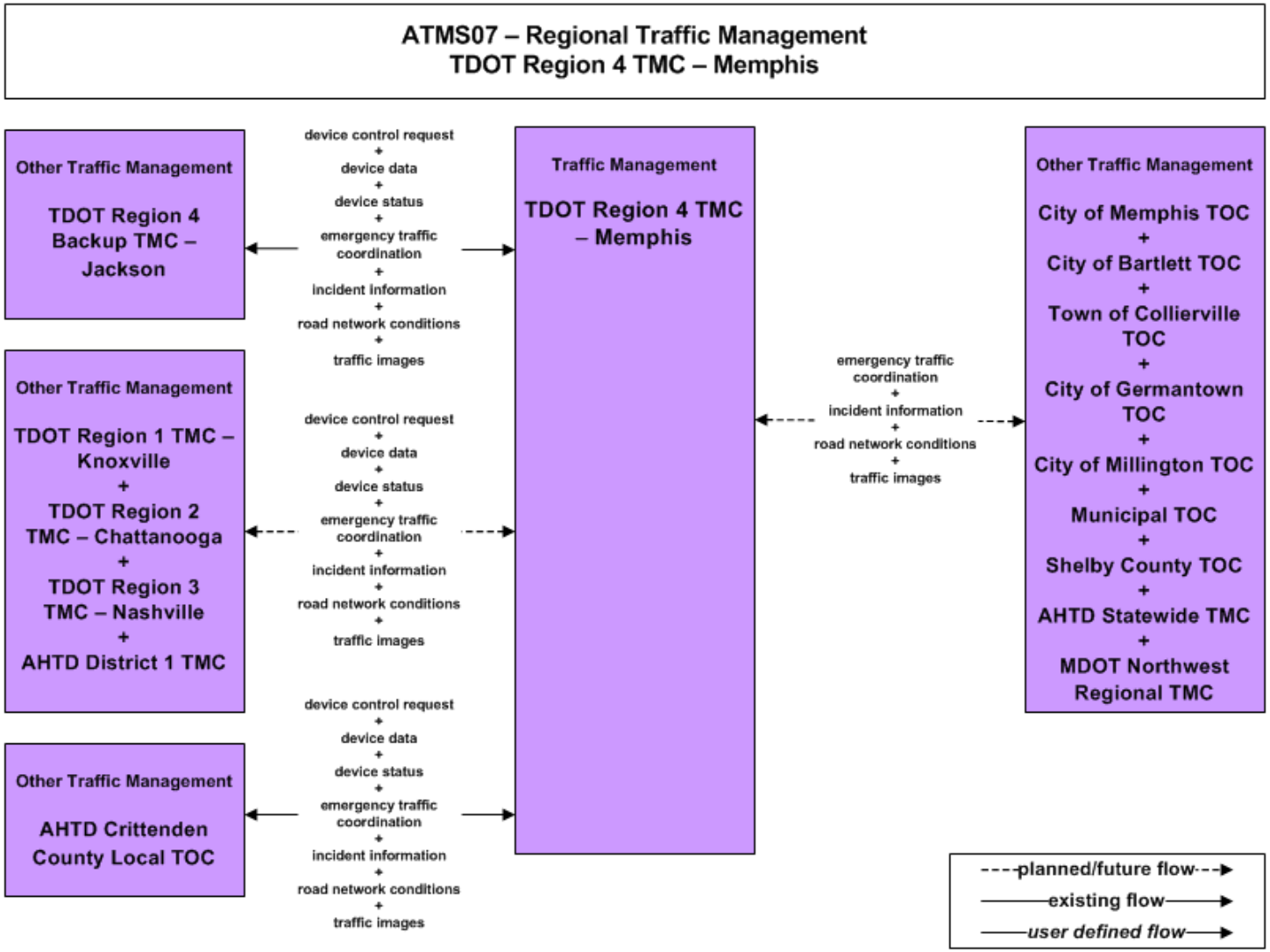
High Priority ITS Service Packages	Medium Priority ITS Service Packages	Low Priority ITS Service Packages
Public Transportation Management		
APTS01 Transit Vehicle Tracking APTS02 Transit Fixed Route Operations APTS03 Demand Response Transit Operations APTS04 Transit Fare Collection Management APTS05 Transit Security APTS06 Transit Fleet Management APTS08 Transit Traveler Information APTS09 Transit Signal Priority APTS10 Transit Passenger Counting	APTS07 Multi-modal Coordination	APTS11 Multimodal Connection Protection
Traveler Information		
ATIS01 Broadcast Traveler Information ATIS02 Interactive Traveler Information		
Commercial Vehicle Operations		
CVO06 Weigh-In-Motion	CVO10 HAZMAT Management	
Archived Data Management		
	AD1 ITS Data Mart	AD2 ITS Data Warehouse AD3 ITS Virtual Data Warehouse

Customized ITS Service Packages

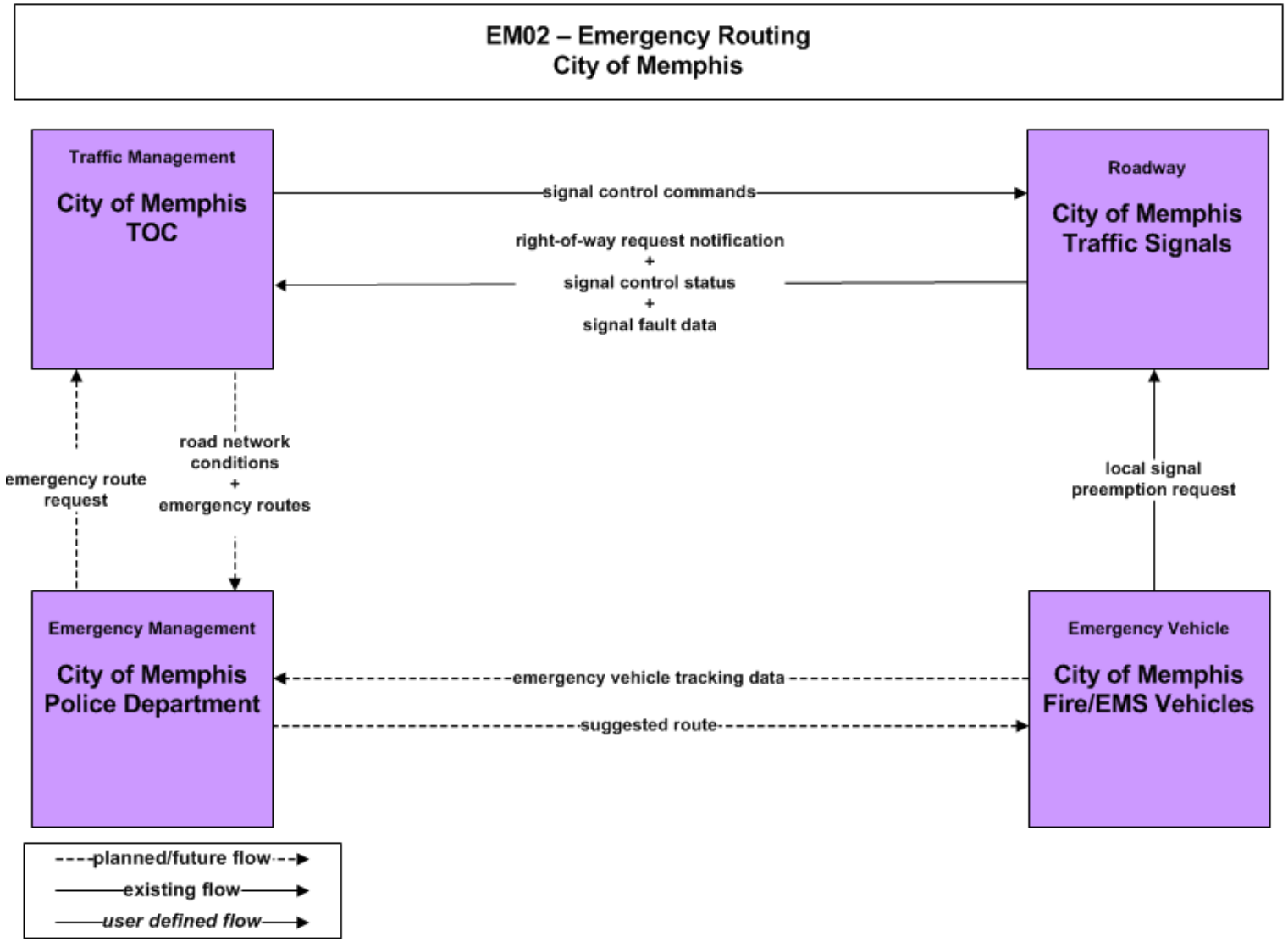
ITS Service Package Diagram



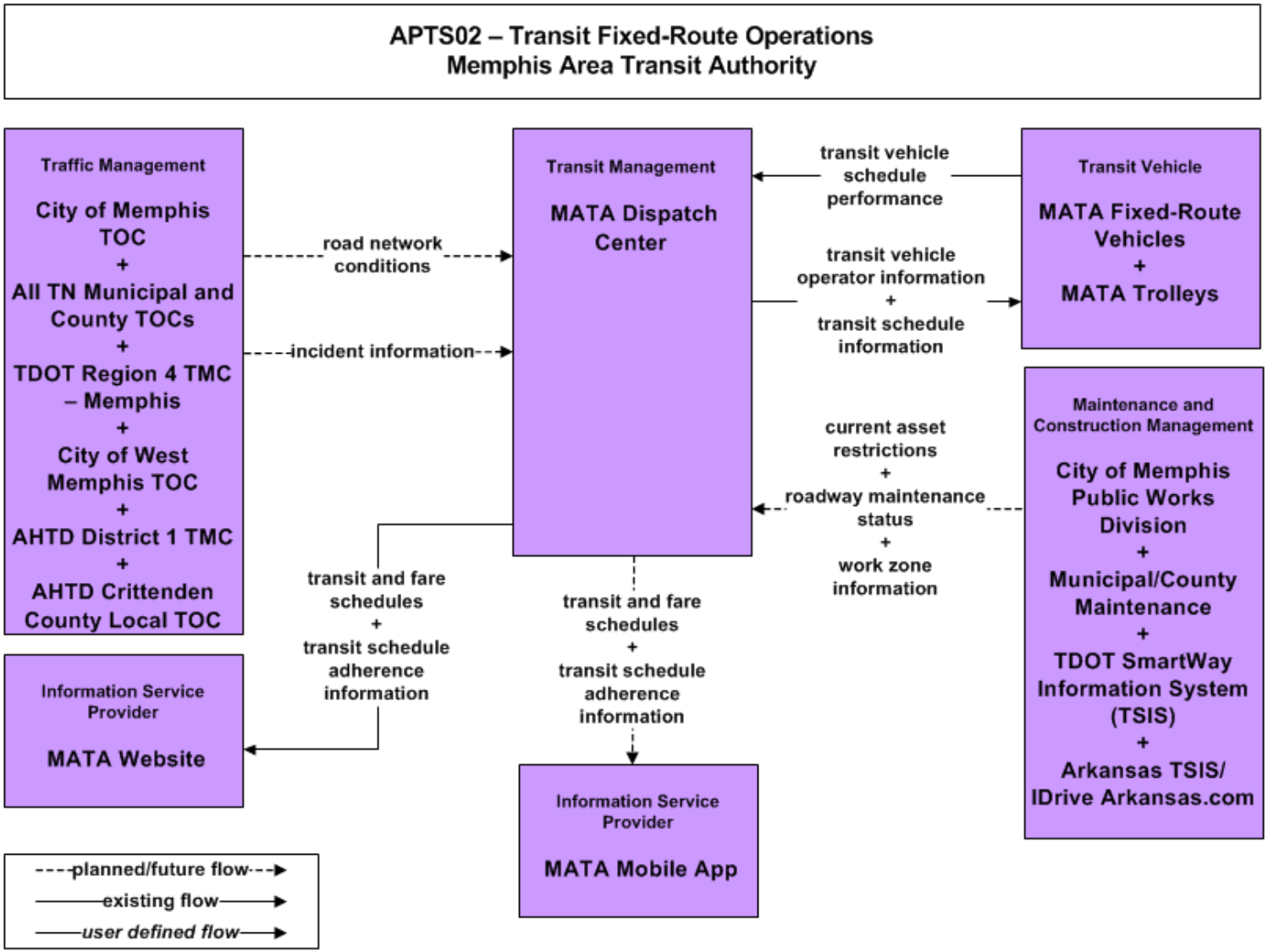
ITS Service Package Diagram



ITS Service Package Diagram



ITS Service Package Diagram



Regional Agreements

Regional Agreements

- Existing Agreements
  - Memphis MPO and West Memphis MPO – Coordination and cooperation for all planning activities
  - City of Memphis and City of Germantown MOU – Traffic signal ITS coordination
  - MDOT and City of Southaven MOU – MDOT TMC location within the Southaven Police Department and sharing of ITS resources
  - TDOT live CCTV video access for governmental agency users agreement
  - TDOT live CCTV video access for private entity users agreement
  - TDOT and AHTD – Deployment and operations of the ITS components along I-40 and I-55 in Crittenden County Arkansas
- Needed Agreements?

ITS Deployment Plan

Deployment Plan Projects

State and Local Deployments

Projects	State	Local
Traffic Management Centers	✓	✓
Vehicle Detection Systems	✓	✓
CCTV Cameras	✓	✓
Coordinated Traffic Signals	✓ MDOT	✓
Traffic Signal Preemption for Emergency Vehicles	✓ MDOT	✓

Deployment Plan Projects

State Deployments, Local Needs

Projects	State	Local
Real Time System Management Information	✓	Need
Freeway Service Patrol	✓ TDOT	
Travel Times	✓	Need
Road Weather Information	✓ MDOT	Need
Traveler Information (Websites)	✓	Need
Traveler Information (Social Media)	✓	Need

Deployment Plan Projects

State and Local Needs

Projects	State	Local
Adaptive Signal Control		Need
Center-to-Center Communications (Local-to-Local)		✓ (Memphis-Germantown)
Center-to-Center Communications (State-to-Local)	✓ (MDOT-South Haven)	Need
Center-to-Center Communications (State-to-State)	Need	
Integrated Corridor Management	Need	Need
Active Traffic Management (Managed Lanes, Variable Speed Limits)	Need	
Autonomous / Connected Vehicles		

Deployment Plan Projects

Transit

Projects	MATA	Rural
Transit Vehicle Tracking	✓	
Real-Time Transit Arrival Information	✓	
Advanced Trip Planning Applications	✓	
Transit Signal Priority	✓	

ITS Architecture Use and Maintenance Plan

Systems Engineering

Definition

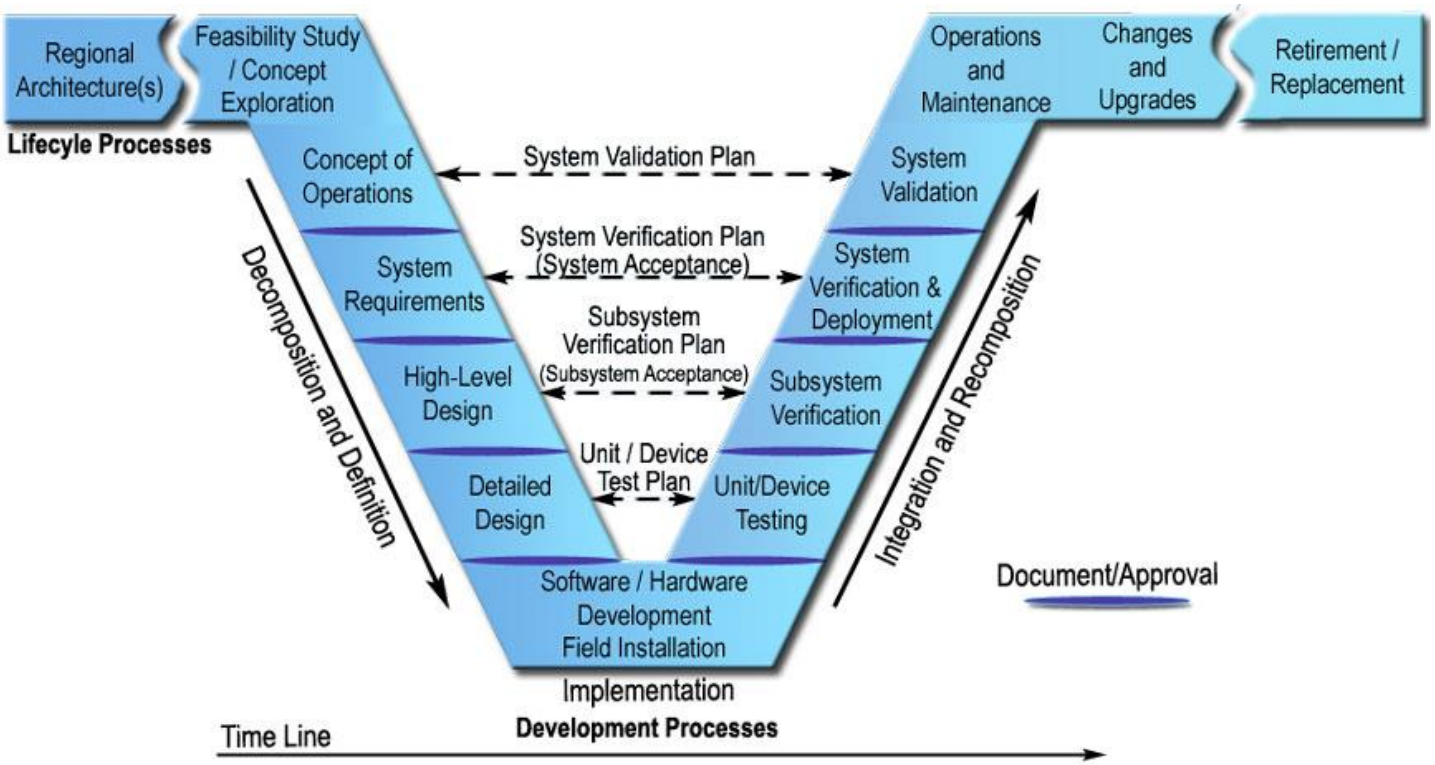
Systems engineering is an interdisciplinary approach to enable the realization of successful systems. It **focuses on defining customer needs and required functionality early** in the development cycle, documenting requirements, then proceeding with design synthesis and system validation while considering the complete problem.

Requirements

Using a systems engineering approach is required by the USDOT for ITS projects. The process includes demonstrating conformance to the Regional ITS Architecture.

Additional guidance has been developed by the FHWA Tennessee Division and TDOT.

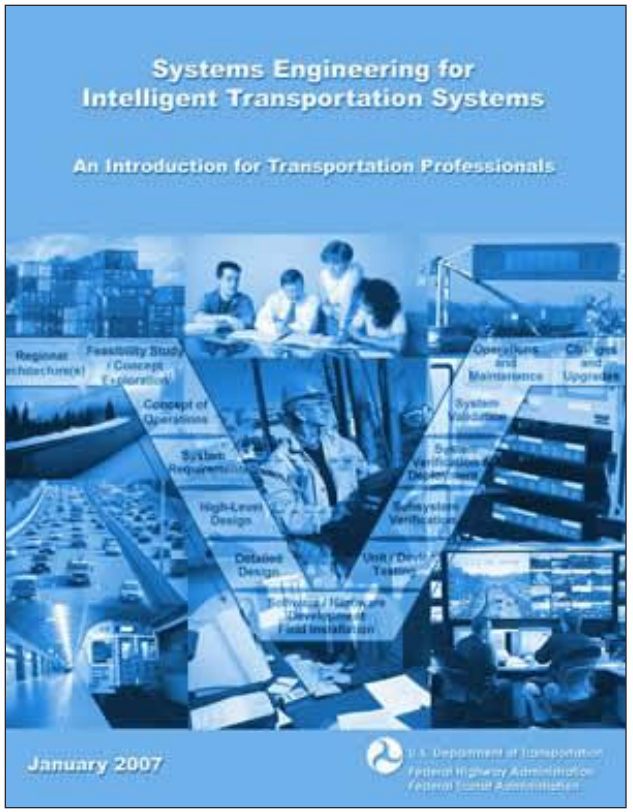
Systems Engineering



Resources

FHWA Systems Engineering for Intelligent Transportation Systems

An Introduction for Transportation Professionals



TDOT Traffic Design Manual

Chapter 8 - Intelligent Transportation Systems

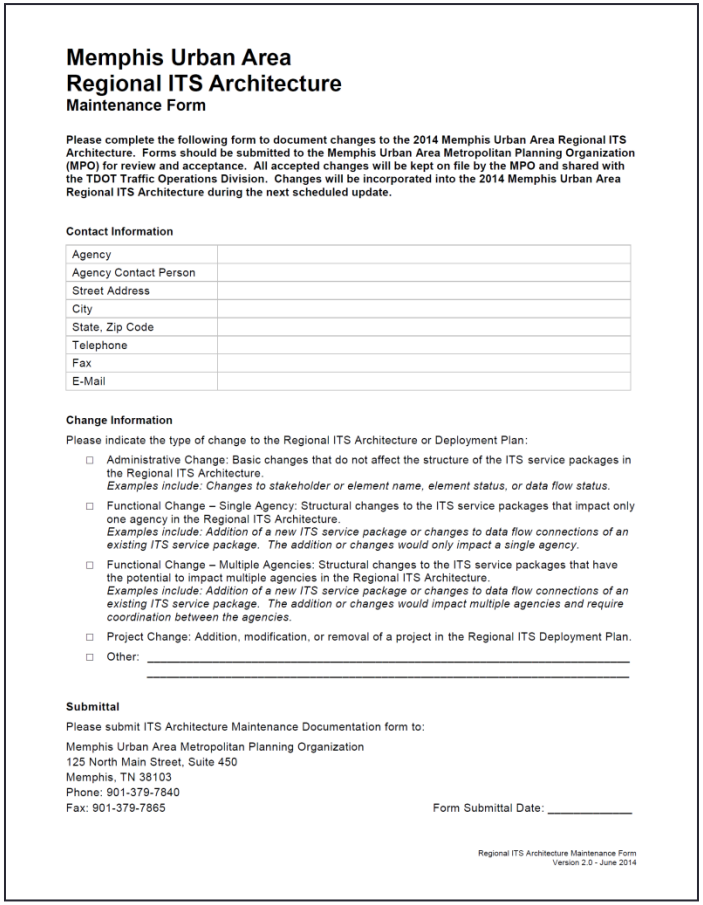
Systems Engineering in Tennessee

- Guidance contained in TDOT Traffic Design Manual Chapter 8 – Intelligent Transportation Systems
- A systems engineering analysis (SEA) must be performed for ITS projects unless a project is categorically excluded
- Categorically excluded projects fall into one of the following:
  - Projects that do not utilize a centralized control or share data with any other agencies
  - Expansions or enhancements to existing systems that do not add any functionality

Use and Maintenance Plan

ITS Architecture Maintenance Procedure Needs to Identify:

1. Lead Maintenance Agency
2. Maintenance Process (Documentation Form)
3. Timeframe for Updates



Memphis Urban Area
Regional ITS Architecture
Maintenance Form

Please complete the following form to document changes to the 2014 Memphis Urban Area Regional ITS Architecture. Forms should be submitted to the Memphis Urban Area Metropolitan Planning Organization (MPO) for review and acceptance. All accepted changes will be kept on file by the MPO and shared with the TDOT Traffic Operations Division. Changes will be incorporated into the 2014 Memphis Urban Area Regional ITS Architecture during the next scheduled update.

Contact Information

Agency	
Agency Contact Person	
Street Address	
City	
State, Zip Code	
Telephone	
Fax	
E-Mail	

Change Information

Please indicate the type of change to the Regional ITS Architecture or Deployment Plan:

- ☐ Administrative Change: Basic changes that do not affect the structure of the ITS service packages in the Regional ITS Architecture.
  Examples include: Changes to stakeholder or element name, element status, or data flow status.
- ☐ Functional Change – Single Agency: Structural changes to the ITS service packages that impact only one agency in the Regional ITS Architecture.
  Examples include: Addition of a new ITS service package or changes to data flow connections of an existing ITS service package. The addition or changes would only impact a single agency.
- ☐ Functional Change – Multiple Agencies: Structural changes to the ITS service packages that have the potential to impact multiple agencies in the Regional ITS Architecture.
  Examples include: Addition of a new ITS service package or changes to data flow connections of an existing ITS service package. The addition or changes would impact multiple agencies and require coordination between the agencies.
- ☐ Project Change: Addition, modification, or removal of a project in the Regional ITS Deployment Plan.
- ☐ Other: _____

Submittal

Please submit ITS Architecture Maintenance Documentation form to:

Memphis Urban Area Metropolitan Planning Organization
125 North Main Street, Suite 450
Memphis, TN 38103
Phone: 901-379-7840
Fax: 901-379-7865

Form Submittal Date: _____

Regional ITS Architecture Maintenance Form
Version 2.0 - June 2014

Use and Maintenance Plan

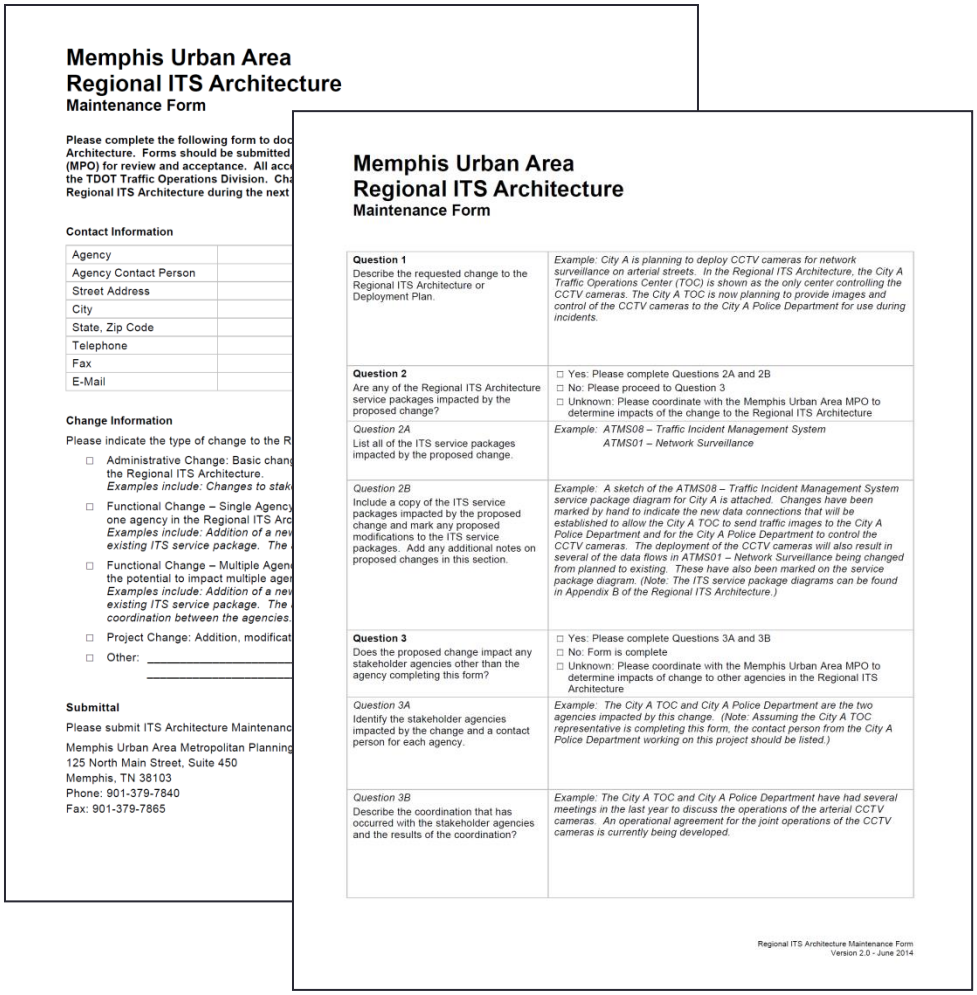
Project Manager Evaluates Conformance to Regional ITS Architecture

↓

Project Manager Completes ITS Architecture Maintenance Documentation Form and Submits to Maintainer

↓

Maintainer Confirms Receipt of Form and Files Form for Use During Next Update



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- ☐ Project Change: Addition, modificat
- ☐ Other: _____

Submittal

Please submit ITS Architecture Maintenanc

Memphis Urban Area Metropolitan Planning
125 North Main Street, Suite 450
Memphis, TN 38103
Phone: 901-379-7840
Fax: 901-379-7865

Memphis Urban Area
Regional ITS Architecture
Maintenance Form

Question 1 Describe the requested change to the Regional ITS Architecture or Deployment Plan.	*Example: City A is planning to deploy CCTV cameras for network surveillance on arterial streets. In the Regional ITS Architecture, the City A Traffic Operations Center (TOC) is shown as the only center controlling the CCTV cameras. The City A TOC is now planning to provide images and control of the CCTV cameras to the City A Police Department for use during incidents.*
Question 2 Are any of the Regional ITS Architecture service packages impacted by the proposed change?	☐ Yes: Please complete Questions 2A and 2B ☐ No: Please proceed to Question 3 ☐ Unknown: Please coordinate with the Memphis Urban Area MPO to determine impacts of the change to the Regional ITS Architecture
Question 2A List all of the ITS service packages impacted by the proposed change.	*Example: ATMS08 – Traffic Incident Management System* *ATMS01 – Network Surveillance*
Question 2B Include a copy of the ITS service packages impacted by the proposed change and mark any proposed modifications to the ITS service packages. Add any additional notes on proposed changes in this section.	*Example: A sketch of the ATMS08 – Traffic Incident Management System service package diagram for City A is attached. Changes have been marked by hand to indicate the new data connections that will be established to allow the City A TOC to send traffic images to the City A Police Department and for the City A Police Department to control the CCTV cameras. The deployment of the CCTV cameras will also result in several of the data flows in ATMS01 – Network Surveillance being changed from planned to existing. These have also been marked on the service package diagram. (Note: The ITS service package diagrams can be found in Appendix B of the Regional ITS Architecture.)*
Question 3 Does the proposed change impact any stakeholder agencies other than the agency completing this form?	☐ Yes: Please complete Questions 3A and 3B ☐ No: Form is complete ☐ Unknown: Please coordinate with the Memphis Urban Area MPO to determine impacts of change to other agencies in the Regional ITS Architecture
Question 3A Identify the stakeholder agencies impacted by the change and a contact person for each agency.	*Example: The City A TOC and City A Police Department are the two agencies impacted by this change. (Note: Assuming the City A TOC representative is completing this form, the contact person from the City A Police Department working on this project should be listed.)*
Question 3B Describe the coordination that has occurred with the stakeholder agencies and the results of the coordination?	*Example: The City A TOC and City A Police Department have had several meetings in the last year to discuss the operations of the arterial CCTV cameras. An operational agreement for the joint operations of the CCTV cameras is currently being developed.*

Regional ITS Architecture Maintenance Form
Version 2.0 - June 2014

Regional ITS Architecture Maintenance Process

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

Thank You!

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