



**EAST-WEST GATEWAY**  
Council of Governments

**ST. LOUIS REGIONAL ITS ARCHITECTURE  
EXECUTIVE SUMMARY (ARCHITECTURE)**

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Submitted to

**East West Gateway Council of Governments**

Submitted by



In association with

**EFK♦Moen, LLC**  
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## Introduction

The East-West Gateway Council of Governments (EWG) is updating the Intelligent Transportation System (ITS) Architecture for the St. Louis Metropolitan Region. The Architecture provides a framework for the planning and development of technology projects that improve the safety and efficiency of travel in the region. This framework complements EWG’s Long Range Transportation Plan (LRTP) and Congestion Management Process (CMP), and has identified a series of ITS projects that will further public mobility and safety through expanded collection and exchange of transportation network information, along with improved coordination between transportation agencies.

The end products of this effort are a Regional ITS Architecture and a Strategic Deployment Plan that defines the way forward in deploying ITS in the St. Louis region. This summary briefly describes the Regional ITS Architecture.

## Architecture Development Process

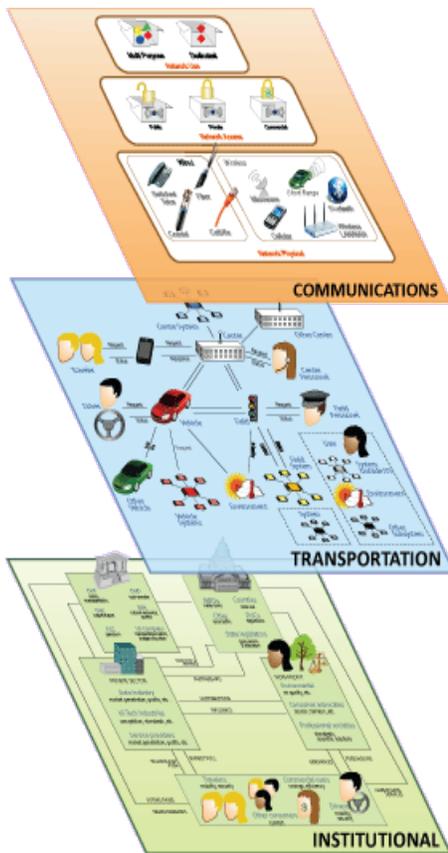


Figure 1: “3-Layer View” of an ITS Architecture

The Architecture development process is focused on both deriving an operational strategy that fits within the context of the regional transportation vision and identifying the framework by which it is implemented. The ITS architecture provides such a framework, in which multiple systems, subsystems, and stakeholders can work together to implement a regional transportation and mobility vision.

The ITS architecture framework (Figure 1) is based on the National ITS Architecture, and is comprised of two technical layers, a Transportation Layer and a Communication Layer, which must operate in the context of a third layer, called an Institutional Layer.

- The *Communications Layer* provides for the accurate and timely exchange of information between systems to support the transport solutions.
- The *Transportation Layer* is where the transportation solutions are defined in terms of the subsystems and interfaces and the underlying functionality and data definitions that are required for each transportation service. This layer is the heart of the ITS Architecture.
- The *Institutional Layer* includes the institutions, policies, funding mechanisms, and processes that are required for effective implementation, operation, and maintenance of an intelligent transport system. The Institutional Layer is shown as the base because solid institutional support and effective decisions are prerequisite to an effective ITS program. This is where the ITS objectives and requirements are established.

### Project Area and Stakeholders

The St. Louis Regional ITS Architecture covers the EWG planning area boundaries encompassing four counties and the independent City of St. Louis within the state of Missouri and three counties in the state of Illinois. The region includes Interstate highways, U.S. and State numbered routes, city and county roads, MetroLink light rail services, Metro Transit and other area bus services, plus Lambert-St. Louis International Airport along with railroad services. The Mississippi River serves as a principal navigable waterway, primarily for barge traffic traveling to or from St. Louis as well as beyond. The region also contains expanding bicycle and pedestrian facilities across the region, many of which follow major arterials and connect into transit services.

The regional ITS stakeholders defined for this ITS Architecture Update effort represent the full range of public entities in the St. Louis area. At the same time, much of the ITS deployment to date has been focused on work done or led by the following agencies:

- Missouri Department of Transportation (MoDOT), District 6
- St. Louis City, Department of Streets, Traffic Division
- St. Louis County, Department of Highways and Traffic
- St. Charles County, Transportation Department
- Illinois Department of Transportation (IDOT), District 8
- Metro Transit (Bi-State Development Agency)

Various county and municipal representatives as well as police, fire and rescue staff, along with Lambert Airport, were invited by EWG to participate in this process, and have contributed greatly to the discussions resulting in both the Regional ITS Architecture and Strategic Deployment Plan. US Department of Transportation representatives from the Federal Highway Administration (FHWA) have also served as partners in this effort.

### Building on Current Initiatives

The Regional ITS Architecture builds on a strong infrastructure established by Missouri DOT and Illinois DOT, with key initiatives led by St. Louis and St. Charles Counties and the City of St. Louis. Metro Transit has also recently enhanced its real-time information capabilities for regional travelers. Key components of the current infrastructure are summarized in Table 1 below, and include various components such as operations centers, traffic flow detection, closed-circuit television (CCTV) cameras, dynamic message signs (DMS), road weather information systems (RWIS), central computerized traffic signal control systems, and fiber optic communications, along with real-time information available via dedicated agency web sites. Other elements are also summarized in the table.

# St. Louis Regional ITS Architecture Update Needs Analysis and Gap Assessment Report

**Table 1: Existing ITS Component Overview in the St. Louis Region**

Agency (with system name, if any)	Operations Center	Traffic Flow Detection	CCTV	DMS	RWIS	Signal Systems	Fiber Optics	Freeway Service Patrols	Automatic Vehicle Location	Real-Time Websites
Missouri DOT (Gateway Guide)	•	•	•	•	•	•	•	•		•
Illinois DOT	•	•	•	•	•	•	•	•		•
City of St Louis	•	•	•			•	•			•
St Louis County	•	•	•			•	•			•
St Charles County (Gateway Green Light)	•	•	•			•	•			•
Metro Transit	•								•	•

## Overview of Needs

During the course of the architecture update effort between January and June 2015, the project team met twice with the larger stakeholder group to address current transportation issues and perceived needs. These outreach efforts were accompanied by one-on-one interviews with key agencies and a user needs survey provided to all stakeholders. The following is a synopsis of the observations.

By definition, a regional ITS architecture encompasses both agency-specific ITS projects and initiatives as well as multi-agency, integrated regional ITS projects and initiatives, along with a data sharing framework that can enhance both regional and localized operations. By this measure, there are clearly agency-specific initiatives underway in the St. Louis region based on the inventory activities completed to date, as well as areas of ad hoc interagency cooperation for specific events, including major construction projects as well as special events. Further, the project team found that many county-level traffic signal operations activities in Missouri actively engage local agencies as well as MoDOT. Finally, there is a current regional framework (STARRS) that addresses emergency and disaster response activities.

However, there are no day-to-day systems for interagency data sharing or regional operational coordination involving technology applications. For example, there is no framework for providing emergency road or street closure information to transit providers so they can reroute or reassign buses in order to meet their service needs. Another example is that obtaining traveler information for the region generally requires the user to access agency-specific web sites, or access private-sector based data (e.g., Google, Apple maps) that may not incorporate incident or road closure information from public agencies, or the ability to access various kinds of real-time traffic and travel information beyond the color traffic data, such as real-time feeds for all regional transit services.

## St. Louis Regional ITS Architecture Update Needs Analysis and Gap Assessment Report

The following is a summary of the ITS Goals originally defined by the steering committee, in priority order based on the overall needs assessment:

- Improve real-time travel information access, application, and use among the traveling public
- Improve multimodal travel data/information sharing among the region's jurisdictions and transportation agencies
- Integrate efficient and effective ITS into regional transportation planning and project development
- Improve the ability to evaluate and measure the performance of the transportation network through the use of technology
- Improve the utilization of existing facilities and infrastructure and maintenance of the ITS infrastructure
- Use ITS to improve multimodal transportation system safety, capacity and functionality
- Increase the safety and security of all modes of transportation through improved infrastructure monitoring, emergency management, and timely data sharing between transportation, safety, and rescue agencies

While all of the above are clearly relevant to the regional transportation vision, the emphasis on information both for public consumption and for sharing between transportation operating agencies and jurisdictions points to a very high priority on improving the quality of data that is provided and shared. Doing this supports multiple system goals. One other area to consider is the importance of information sharing and monitoring with respect to carrying out regional management activities such as the CMP.

### Operational Concept

The ITS Operational Concept is a stakeholder-oriented view of operational characteristics, which describes stakeholder roles and responsibilities in developing, operating and maintaining regional ITS activities. The Operational Concept also serves as a basis for ITS deployment.

### Current Scheme

The current ITS operational scheme for the St. Louis region is most notable for the following:

- Agencies generally focus on managing their own assets and facilities
- Traveler information is agency-specific, public users must access multiple websites/apps to get data, and not all modes have real-time information
- Limited/ad hoc data exchange exists (mainly signal timing), generally between two agencies. The Gateway Green Light (GGL) traffic control system in St. Charles County has implemented a degree of interoperability with MoDOT video and traffic data as well as state traffic signals, and hosts local traffic signal operations through providing local workstations on the GGL network
- Limited to no interoperability of communications between incident response teams and multiple public safety agencies such as fire and police

## St. Louis Regional ITS Architecture Update Needs Analysis and Gap Assessment Report

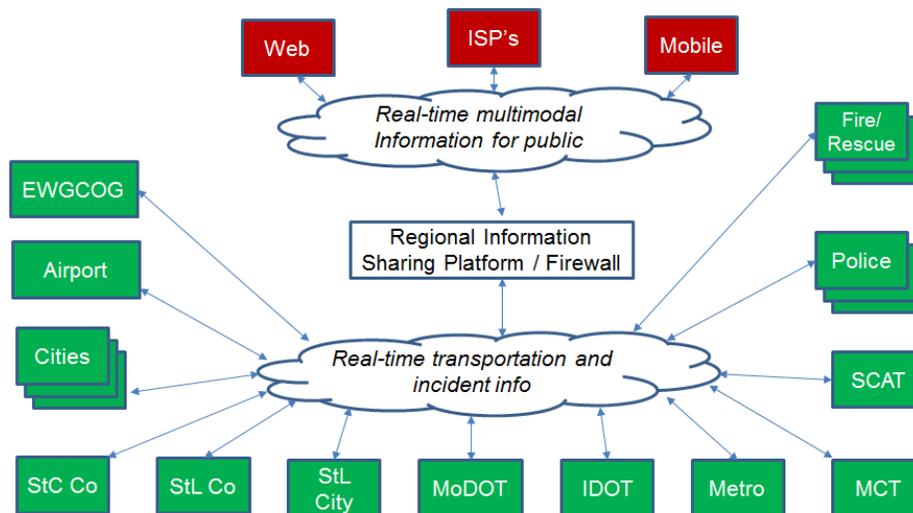
- In general, data exchange and wireless communications are not standardized between transportation agencies, police and first responders, although a regional communications network has been implemented through the regional STARRS emergency management coalition.
- No current means of automated regional data archiving and trend analysis to support CMP activities

### Proposed Operational Concept

The proposed Operational Concept will support both the sharing of traffic and incident information in order to speed responses to both recurring and non-recurring conditions on freeways and parallel arterials, and will support development of a “one-stop” regional traveler information system that incorporates data from all regional transportation agencies relative to real-time freeway, arterial and transit information, enabling a comparison of all modes for all origin-destination pairs in the region.

This coordination also would serve as a basis for Integrated Corridor Management (ICM) strategies which enable, for particular corridors, data sharing and coordination between state, county and local transportation agencies and Metro, with the intent being to improve traffic flow and provide improved information on transit alternatives, including parking information at stations where parallel MetroLink services are available.

Figure 2 presents a view of the Proposed Operational Concept for ITS in the St Louis region.



**Figure 2: Proposed ITS Operational Concept for the St. Louis Region**

Key tenets of the proposed concept are as follows:

- Standardized incident, traffic, video information for exchange between transportation agencies and first responders
- Interagency coordination as needed for traffic operations, incident, emergency, work zone and event management

## St. Louis Regional ITS Architecture Update Needs Analysis and Gap Assessment Report

- Provide ability for public to access real-time travel information (traffic and transit) in one place and be able to make multi-modal travel comparisons and decisions
- Improve multi-modal connectivity (bus, rail, parking)
- Create a standard data archiving capability for regional performance management and monitoring in support of CMP

### Architecture Overview

For the St. Louis Region, ITS services have been defined for the following areas relevant to the above operational concept and user needs.



Figure 3 shows the Architecture Interconnect Diagram for the St. Louis region, highlighting those elements contained within the existing and planned architecture. The physical architecture view contains a series of domains (center, travelers, field [or infrastructure] and vehicles) between which ITS communications need to occur, and each of which contain subsystems of various types.

**Centers** provide management, administrative, and support functions for the transportation system. A center represents a collection of functionality and not necessarily a physical facility. Examples of centers in the St. Louis region are the MoDOT Gateway Guide Traffic Management Center and City of St. Louis Traffic Operations Center.

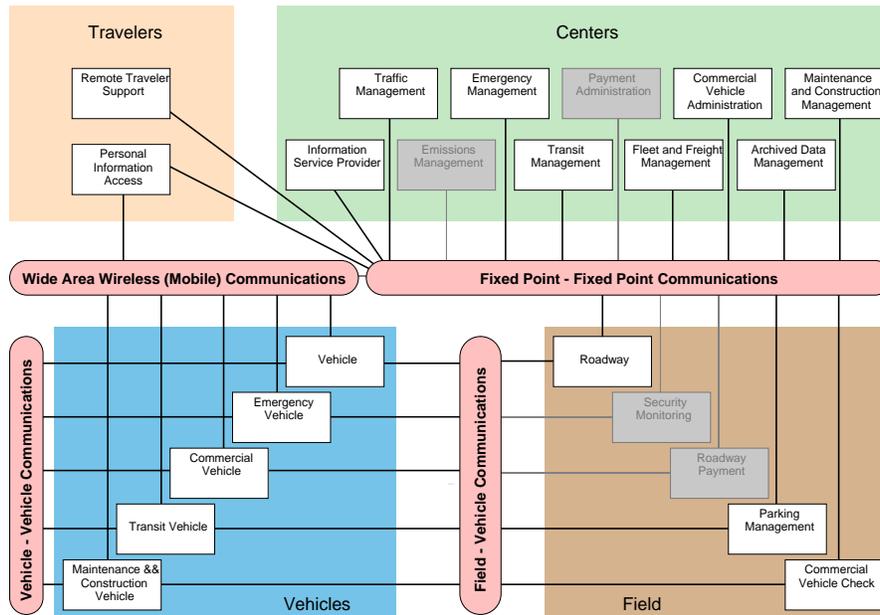
**Field** entities are connected infrastructure along the transportation network that perform surveillance, information provision, and plan execution control functions. A field entity's operation is governed by a center subsystem. They may also directly interface to vehicles.

**Travelers** refer to the equipment used by travelers to access ITS services pre-trip and en-route. This includes equipment that are owned and operated by the traveler as well as equipment that are owned by transportation and information providers, such as information kiosks.

## St. Louis Regional ITS Architecture Update Needs Analysis and Gap Assessment Report

**Vehicles** refer to ITS related elements on vehicle platforms and include general driver information and safety systems applicable to all vehicle types. Four fleet vehicle subsystems (Transit, Emergency, Commercial and Maintenance and Construction Vehicles) add ITS capabilities unique to these special vehicle types.

The subsystems in the National ITS Architecture not included in the regional architecture include Payment Administration, Emissions Management, Security Monitoring, and Roadway Payment. Because of how the architecture is constructed, such systems may be readily added in the future as they become of interest and necessity to the stakeholders in the region.



**Figure 3: St. Louis Regional ITS Architecture Interconnect Diagram (Top-Level)**

The entities are not defined by their size or physical presence, but by their functionality. For example, a traffic management center may be a large facility with a video wall, multiple workstations and other amenities where an agency controls its devices and monitors traffic conditions. A traffic management center may also be a single laptop that remotely exchanges information with field devices, disseminates traffic information and controls signs and signals. In addition, a single ITS element may serve as multiple types of centers. For example, a city may have a single system to manage both traffic and emergency response, making it both a traffic management center and emergency management center.

The architecture is “built” upon a combination of desired system functions (known as “ITS Service Packages”) and desired system connections (known as “System Interfaces”). These are derived from both (a) an analysis of regional transportation needs and (b) establishing an “operational concept” describing how agencies and other stakeholders are to work together in the future to improve transportation.