



Executive Summary of the Bay Area ITS Architecture

Original: December 27, 2007

Revised: February 29, 2012

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1.0 Introduction

The Bay Area Intelligent Transportation Systems (ITS) Architecture is the regional plan for the Bay Area. The Architecture was prepared under the direction of the Metropolitan Transportation Commission (MTC) based on input from a broad range of stakeholders. Its purpose is to facilitate ITS planning and to aid in ITS project development and procurement. This document provides an overview of the Bay Area's Intelligent Transportation System (ITS) Architecture.

ITS refers to the use of communication technologies to improve transportation safety, operations, and efficiency. This definition encompasses a broad range of technologies and has created many opportunities for transportation professionals to respond proactively to increasing demand for effective transportation services. Many of these opportunities are predicated upon effective coordination between organizations, at both the institutional and technical level.

The Bay Area ITS Architecture along with its technical framework is one vehicle to facilitate coordination between organizations. The ITS Architecture represents a coordinated approach (over a ten-year horizon) to installing and operating technologies in the transportation system environment across jurisdictions in the Bay Area. It can be used to identify ITS deployment priorities, coordinate projects, and understand agency roles and responsibilities associated with ITS.

An update to the Bay Area ITS Architecture was prepared under the direction of the Metropolitan Transportation Commission (MTC) between May and December of 2011 and focused on updating the 2007 version of the Architecture for changes that have occurred over the last four years¹. This included changes and additions to projects, stakeholders, and the National ITS Architecture template on which it is based on. The process for updating the Architecture relied on stakeholder input to ensure the Architecture was truly regional and multi-jurisdictional. The stakeholders represent a cross-section of agencies including regional, local, transit, smart corridor, and emergency service agencies.

¹ The 2007 Bay Area ITS Architecture was an update by Kimley-Horn and Associates, Inc. to the "Bay Area Regional Intelligent Transportation Systems (ITS) Plan" (June 2004) owned by MTC and prepared by Iteris, Inc.



Feedback was elicited in the form of individual and targeted group requests and from an online survey.

Agencies in the Bay Area that implement ITS projects using Federal transportation funds are required to be consistent with the Bay Area ITS Architecture (pursuant to 23 CFR 940.9 and 940.11). In addition, ITS projects must comply with system engineering requirements and applicable Federal standards. This Architecture provides all the components required by the FHWA Final Rule and FTA Policy for regional ITS architectures. The Architecture is designed for ease of use and understanding in support of project planning and development .

The Architecture is project-based, meaning that stakeholders access, understand, and use the Architecture directly via project names and types. Most other Architectures from across the nation use a different organization of content based on predetermined types of systems. The Bay Area approach encourages use of this Architecture for actual project development and coordination, thereby promoting systems that connect and share and minimize duplicating investments.

The Architecture uses laymen's terms. The National ITS Architecture provides not only a framework but a vocabulary that has historically been used in Regional Architectures and ITS Plans. The Bay Area has altered the approach to ensure that, while providing full compliance with federal rules and policies, the Architecture minimizes jargon, making the document more accessible by a variety of project sponsor staff, regardless of technical background or tenure in ITS/technology-based projects.

The Architecture is web-based. It is not a paper report posted online, but a truly robust, organized and accessible web site that answers stakeholders'





requests in an easy-to-browse manner. A PDF of the Architecture is also available. The Architecture website is located at:

<http://www.mtc.ca.gov/planning/ITS/>

The 2011 ITS Architecture can be used as a roadmap to integrated, complementary regional project investment in the Bay Area, continuing our tradition of coordinated programs. By referring to this document during project development, project sponsors can determine with whom to coordinate projects, where regional projects may be able to provide solutions to local agencies (thereby reducing potential duplication of spending), and how to move toward further sharing of information (through the use of regional standards).

2.0 Background

ITS is a collection of communication and technology applications that are used to increase information to users of roadways and transit systems and make managing the assets and infrastructure more efficient and effective. Information technology can make transportation infrastructure more efficient at a fraction of the cost of infrastructure projects. The Bay Area ITS Plan covers the nine-county Bay Area, and addresses the needs and interests of stakeholders large and small within the region. Over 300 projects have been mapped together in this comprehensive outline to identify not only what is in place today but how to move toward the next generation of integration and effectiveness for the region. This means that we get more for less: more mobility, more air quality conformance, more efficient travel, at a lower, combined cost for our region.

In order to be eligible for federal funding, projects must be consistent with the regional ITS architecture. In order to accommodate this requirement and assist project sponsors in quickly and thoroughly understanding what that means to their projects, the Architecture has been developed to address project specifics in different ways:

Find a Specific Project by Project Sponsor or Project Category

The first way is to look up your project by the name of the sponsoring public agency (such as BART, Caltrans, or the City of San Jose) or search by category of projects (such as Transit Information or Toll Management). From there you can quickly jump to diagram(s) that represent that project in relation to other projects and agencies in the area. This provides the benefit of showing a project sponsor, at a glance, how their projects connect with others in the Bay Area now



and in the future. More detailed information is available as well, by traversing the web-based Architecture in more detail.

Find a Representative Project

If a project is not listed by name, it may still conform to the Regional ITS Architecture. The Architecture includes a list of projects that support common ITS services such as 'Traveler Information'. These representative projects are not assigned to a specific stakeholder, but could be either existing or planned deployments in the region. As such, the Bay Area ITS Architecture is specifically designed to address the long-term potential for integrated and coordinated technologies in addition to what is happening today. So, in addition to documenting how planned and existing projects fit together, the Architecture shows how future projects can be coordinated. Specific guidelines are provided to walk project sponsors through finding where their projects fit in the Architecture (for federal regulations requiring conformance with the regional ITS architecture) and how to use different parts of the Architecture toward project planning and design, if desired.

Find a Regional ITS Project

You can also check if your project interfaces with one of the major regional ITS projects, such as 511, Express Lanes or emergency management services. The Architecture web site provides a page that includes a high-level diagram and description as an introduction for each project, which may otherwise be represented in multiple places or diagrams in the Architecture. The diagram is a non-technical, conceptual illustration of the interconnections and information exchanges between the sub-elements of the overall program. Resource links to the project's available technical documentation such as functional requirements, standards, and concept of operations are provided for more information.

3.0 Stakeholder Roles and Responsibilities

Champions from cities, counties, law enforcement, MTC, Caltrans, transit agencies, CMA's, and special purpose agencies round out the list of stakeholders, large and small, who have had input to the development of the Architecture over time. The Architecture illuminates critical relationships among these agencies from an operational standpoint, with a special emphasis on the information and infrastructure that is produced and shared as ITS projects are deployed and operated.



4.0 Technical Detail

The overall purpose of the Architecture is to establish how projects interact. The technical detail provides information such as which standards and interfaces can move the region toward greater integration, and depicts, for the benefit of project sponsors, which other projects and agencies might be connected in the future. Future integration emphasis for Bay Area agencies should promote connectivity to, and build-out of, large regional and sub-regional projects. These projects, such as the center-to-center project and the smart corridors, provide regional data sharing opportunities and help to realize the maximum potential of previous and ongoing investment. This technical detail is helpful to project sponsors in that it identifies with which potential partners or agencies to coordinate and provides details supporting connections and standards.

While over 300 projects are listed by name in the Architecture, emphasis is placed on large-scale, regional and sub-regional projects that most require and promote connectivity and coordination. These projects include, where applicable, additional diagrams and details that show relationships for partner agencies and provide further guidance for connecting with these systems. For example, 511 is represented by four different projects in the regional ITS Architecture. A high-level diagram is also included that shows how these four components fit together to comprise the full program. Another example is that the actual functional requirements are provided for the Center-to-Center Network project. This would allow an agency planning to share data in the region to review these functions and determine whether the existing, regional center-to-center project would fit their needs. This can have the result of reducing duplication of expenditure on data sharing activities in the region, thereby further capitalizing on regional investment.

The major regional/sub-regional projects emphasized in the Architecture include:

- 511: Traffic, Real-time Transit, Regional Transit Information System (RTIS), Parking
- Center-to-Center Network
- Express Lanes
- FasTrak®
- Call Boxes/Freeway Service Patrol
- Clipper®
- Emergency Management
- Freeway Performance Initiative (FPI)



- I-80 Integrated Corridor Mobility (ICM)
- Incident Management
- SFpark
- Smart Corridors (East Bay, Silicon Valley, San Mateo, Tri-Valley)

The Bay Area ITS Architecture also provides information about how stakeholders can make use of the information in the Architecture to further project planning, project development and design, and procurement. In particular, it provides an introduction to systems engineering requirements for federally-funded projects; systems engineering is a structured process for arriving at a final design and deployment of an ITS system.

5.0 Maintenance of the ITS Architecture

Maintenance of the ITS Architecture may be periodically necessary to comply with federal regulations and facilitate coordination and integration of ITS projects. To this end, MTC will continue to serve as the lead agency responsible for coordinating Architecture maintenance efforts and project sponsors will continue to be responsible for providing new and updated project information. Between MTC-initiated update efforts, MTC will maintain a list of project updates and additions submitted by project sponsors. If necessary, MTC may convene a Maintenance Committee of representative stakeholders to advise MTC on maintenance activities and other ITS policy and planning issues.

MTC may also need to respond to questions from project sponsors about compliance with federal Architecture and systems engineering requirements. MTC will likely continue to retain consultant services to provide this expertise.