Agenda

- Introductions
- Meeting Purpose & Project Overview
- ITS Architecture Overview
- Review and Update ITS Stakeholders and Elements
- Service Package Overview
- Discussion of Regional ITS Projects

- Lunch Break, Noon – 1:00
- Discussion of Regional ITS Projects (continued)
- Review and Update ITS Service Package Diagrams
- Next Steps

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ITS Architecture Overview
Intelligent Transportation Systems

- **Definition**
  - “The Application of data processing and data communications to surface transportation, to increase safety and efficiency.”

- **Includes Systems within**
  - Traffic Management
  - Transit Management
  - Emergency Management
  - Traveler Information
  - Maintenance Management
History of ITS Architecture

- Broad FHWA funding for regional ITS in early 1990s
- Many systems deployed but data collected was proprietary and systems could not talk to each other
- In 1996, National ITS Architecture established
- In 2001, FHWA issued Rule 940 requiring that ITS architectures be developed for ‘regionally significant’ ITS projects to be eligible for federal funding
National ITS Reference Architecture is a “Living Document”

- Continuing evolution of the architecture over 25 years
Established a framework for integrating connected vehicle applications & technologies that includes:

- Needs/requirements
- Multi-faceted system architecture
- Prioritized interfaces for standardization
- SET-IT tool to support CV project design

Merged into the National ITS Architecture in ARC-IT 8.0
ARC-IT 8.1

- Culmination of 25 years of National ITS Architecture development
- Covers all of ITS, including all of Connected Vehicle
- Enhance systems engineering tool & updated regional architecture tool

ARC-IT 8.1

139 Service Packages

RAD-IT

SET-IT

V7.1

97 Service Packages

CVRIA

96 Applications

ARC-IT 8.1

SET-IT

96 Applications

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Architecture Use

- National ITS Reference Architecture
  - Basis for Regional ITS Architectures
  - Framework for ITS Standards
- Architecture and Standards Support Implementation
  - Project by Project
  - Integrated
  - Interoperable
  - Cost-Effective
ARC-IT Content

- ARC-IT is comprised of the following
  - Architecture Details contained in
    - Databases
    - Diagrams
  - Architecture Website
    - Hyperlinked view of architecture information
  - Software Tools
    - Regional Architecture Development (RAD-IT)
    - Project Development (SET-IT)
**ARC-IT Organization**

- **ARC-IT organized around Service Packages**
  - Represent the portion of each view that provides a single ITS service
ARC-IT Organized around Service Packages

- Represent the portion of each view that provides a single ITS service
- Grouped by areas

- Traffic Management
- Public Transportation
- Maintenance and Construction
- Commercial Vehicle Operations
- Public Safety
- Parking Management
- Vehicle Safety
- Traveler Information
- Data Management
- Support
- Sustainable Travel
- Weather

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Other ARC-IT Key Concepts

- **Physical objects** that interact to deliver services
- Functionality within Physical Objects
  - *Functional Objects*
- Interfaces and *information flows* between the physical objects
Physical Objects

- Organized into 5 Classes
What is a Regional ITS Architecture?

- A regional framework for ensuring institutional agreement and technical integration for the implementation of ITS projects in a particular region
What is Regional ITS Architecture?

- **Does Provide:**
  - A blueprint on how ITS systems will work together to satisfy surface transportation needs.
  - Identifies the ITS stakeholders in a region and their elements
  - Identifies the information to be exchanged between stakeholder elements
  - Selects standards for information exchange

- **Doesn’t Define:**
  - Select specific technologies or design
  - Determine how projects are selected or funded
How National ITS Architecture relates to Regional ITS Architecture

- National ITS Architecture (the cookie cutter)
  - a Framework or Template
  - a menu of possibilities

- Regional ITS Architecture (the cookies)
  - Specific instances, associated with local stakeholders and projects
  - Current inventory + future projects
  - Only the pieces you need
  - Put together based on local needs
  - Extensions, where necessary
Regional ITS Architecture is composed of:

1. Description of the region (Scope)
2. Identification of participating agencies and their systems (Inventory)
3. Operational concept
4. Agreements required for implementation
5. System functional requirements
6. Interface requirements
7. Identification of ITS standards
8. Sequence of projects required for implementation
9. Process for maintaining your ITS Architecture
Inventory: Architecture Elements

- Field Devices
  - Cameras
  - Electronic Signs
  - Speed Sensors
- Centers
  - Traffic Mgmt Center
  - 911 Dispatch
- Vehicles
  - GPS and AVL tracking
- Travelers
Service Packages

- Example: Traffic Information Dissemination

TMC → Dynamic Message Signs

Web Site → Motorist
Benefits of a Regional ITS Architecture

- Transportation planning tool
  - Understand where we are going with our Intelligent Transportation System

- Find opportunities to work together across multiple jurisdictions and agencies

- Regional information sharing opportunities
  - The problem: patchwork deployments that make sharing information difficult
  - Regional ITS Architecture: Get early insight into what ITS information others have that can help you do your job better (or you can provide to others)
  - Identify open ITS standards: reduce long term risk/cost
Still more Benefits

- Institutional Agreement:
  - The problem: Time consuming to develop when information crosses institutional boundaries
  - Regional ITS Architecture: Establish consensus based foundation for agreements – to get the process started
And finally....

- Addresses FHWA Rule/FTA Policy on ITS Architecture and Standards
  - Requires development of a Regional ITS Architecture if using Highway Trust Fund money to fund deployment of projects containing ITS elements
  - Intended to foster integration of ITS
  - Defines requirements for ITS projects
ITS Projects

- Regional ITS Architecture partially satisfies the systems engineering requirements for FHWA Rule/FTA Policy on ITS Architectures and Standards
- Part 940.11 Requirements:
  - Portion of the regional ITS architecture
  - Roles and responsibilities
  - High-level requirements
  - Alternative communications infrastructure
  - Applicable ITS Standards
  - Procurement options
  - Operations and Maintenance
Regional ITS Architecture Described by:

- Database of architecture details (RAD-IT file)
- Customized Service Packages File
- Architecture Document
- Hyperlinked Website
Sacramento Regional ITS Architecture

- **First Version of Architecture developed in 2006**
  - Complete description of elements, services, and projects at that time
  - Found limited use for project development

- **Update needed to**
  - Address new services (e.g. connected vehicle)
  - Address projects planned for the next decade +
  - Plus- update for major changes from ARC-IT V8.1

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In Summary...

- To ensure investments in ITS can be leveraged
  - Primary purpose of ITS is to support daily traffic operations, transit and safety
  - Provide additional services as defined

- To be eligible for FHWA funding
Discussion of Scope, Stakeholders and Elements
SACOG Regional ITS Architecture Scope

- **Geographic**
  - Covers the 6 county SACOG region

- **Time Frame**
  - Existing Today → 20 years in the future, with an emphasis on those ITS activities likely to be implemented in the next 5-10 years

- **Scope of Services**
  - Traffic management, maintenance and construction operations, incident management, emergency services, transit management, traveler information, and archived data management
Who is a Stakeholder?

- **Technical Definition:**
  - Someone that sends or receives transportation information to/from other stakeholders either directly or with their systems.

- **Institutional Definition:**
  - Someone who builds, operates or maintains ITS equipment.
ITS Inventory

- A list of ITS elements and the elements that interface with them.

- And an ITS element is:
  - “The name used by stakeholders to describe high level parts of an ITS system.”

- Types of Elements:
  - Centers – Traffic, Emergency, Transit
  - Field Devices – Traffic, Maintenance
  - Traveler Interfaces – Web sites
  - Data Systems – Planning, Archives
  - Vehicles – Transit, Emergency, Maintenance
Regional ITS Stakeholders and Inventory

- Let’s review the Stakeholders and Inventory
Discussion of ITS Services – Service Packages Overview
ITS Services Cover

Traffic Management

Public Transportation

Maintenance and Construction

Commercial Vehicle Operations

Public Safety

Parking Management

Vehicle Safety

Traveler Information

Data Management

Support

Sustainable Travel

Weather

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Traffic Information Dissemination

- Television Station
- TMC
- Dynamic Message Signs
- Web Site
- Motorist
Automated Transit Fare Payment

Enforcement

Financial Institution

Transit Management Center

Point of Sale / Kiosk

Transit Vehicle

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Physical View- Service Packages

- Service Packages are Portion of Physical View that provide an ITS Service

- Service Packages in the Physical View are defined by a set of:
  - Physical Objects
  - Functional Objects
  - Information Flows

- Plus a diagram showing all how all these are connected.
ARC-IT Service Package - Queue Warning

Traffic Operations Personnel
- Traffic operator input
- Traffic operator data

Traffic Management Center
- Traffic Management
- TMC Roadway Warning
- TMC Environmental Monitoring
- TMC Basic Surveillance

Other Traffic Management Centers
- (2C) road network conditions

Transportation Information Center
- Road Network Information Center

Connected Vehicle Roadside Equipment
- RSE Queue Warning
- RSE Environmental Monitoring
- RSE Traffic Monitoring

ITS Roadway Equipment
- Roadway Warning
- Roadway Information
- Roadway Basic Surveillance

Driver
- Driver information
- Driver input
- Driver updates

Vehicle OBE
- Vehicle Queue Warning
- Vehicle Roadside Information Reception
- Vehicle Environmental Monitoring
- Vehicle Basic Safety Communication

Basic Vehicle
- (1A) host vehicle status
- (1A) collision warning information
- (1A) driver update information

Other Vehicle OBEs
- (1A) vehicle control event + vehicle location and motion
- (1A) vehicle control event + vehicle location and motion

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Customized Service Package Diagrams

- Customize to reflect regional operational concepts
Regional ITS Projects
ITS Projects

- How will your systems evolve?
  - What new or enhanced services will you provide?
  - What systems will you connect to and what information will you share?
  - What agreements need to be in place to make it happen?

- The SACOG Regional ITS Architecture will provide the framework and plan for the evolution of your systems over the next 10 to 20 years.
Review ITS Projects

- ITS Projects Identified from
  - Implementation Plans

- For each project consider
  - Name, Description
  - Key Stakeholders
  - Timeframe (short or long-term)
  - Mapping to Architecture
ITS Projects

- Will input ITS projects into the RADIT database.
- Ability to generate outputs to create a systems engineering analysis and functional requirements for each project.

- Let’s go to Project List......
Next Steps

- Complete Draft Regional ITS Architecture and update project website
- Email to all stakeholders and attendees with information
- Comments solicited from stakeholders
- Architecture updated and finalized after receipt of comments
- Final presentation to stakeholders of Architecture- done by webinar.