

# Inland Empire Regional Intelligent Transportation System (ITS) Architecture Project



## Chapter 3: Draft Functional Requirements and Interface Definition Report

Submitted by:



**INLAND EMPIRE REGIONAL  
INTELLIGENT TRANSPORTATION SYSTEMS (ITS)  
ARCHITECTURE PROJECT**

**CHAPTER 3**

**DRAFT  
FUNCTIONAL REQUIREMENTS  
AND INTERFACE DEFINITION REPORT**

Submitted by

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### **Contained in this Report...**

Each of the written deliverables for the Inland Empire Regional Intelligent Transportation Systems (ITS) Architecture Project will be introduced to the project stakeholders as an individual Chapter of the overall project documentation set. This Report is the third Chapter in what will ultimately be one comprehensive document concerning the ITS Architecture development as well as other associated activities. After receiving stakeholder comments on each Chapter, a disposition of comments will be released detailing the individual comments and how they will be dealt with in modifying the Chapter under review. The individual Chapters (revised based on stakeholder comments) will be re-issued as one document in the Final Report.

Following is a summary listing of the Chapters that will, in total, make up the complete documentation set for the Inland Empire Regional ITS Architecture Project. The Chapters that are either complete or currently under review by the stakeholder group are indicated in bold type.

- **Chapter 1: Inventory Report**
- **Chapter 2: ITS User Needs, Services and Operational Concepts**
- **Chapter 3: Functional Requirements and Interface Definitions**
- Chapter 4: Project Sequencing
- Chapter 5: List of Agency Agreements
- Chapter 6: ITS Architecture Maintenance Plan
- FINAL REPORT

This Report contains the following sections.

#### *Section 3.1: Introduction*

A brief introduction and background to the project is offered in this section.

#### *Section 3.2: Inland Empire ITS Functional Requirements*

This section details the functional requirements for each ITS element in the Inland Empire

#### *Section 3.3: Inland Empire ITS Interconnects and Information Flows*

Section 3.3 identifies the physical connections between systems, presenting the framework that supports the exchange of information. This section also explains the actual information that is exchanged between the ITS elements to support the region's specified ITS services.

#### *Section 3.4: Next Steps*

Provides a discussion of what was accomplished in this Report, and how the subject material contained in this Report will flow into subsequent project activities and deliverables. This section will also outline the next steps in the project.



## **3.0 FUNCTIONAL REQUIREMENTS AND INTERFACE DEFINITIONS**

### **3.1 Introduction**

The Inland Empire\* Intelligent Transportation Systems (ITS) Strategic Plan, developed in 1998, was a joint effort of the local transportation agencies to develop an approach for integration of regional ITS opportunities and projects. Since the development of this Plan, the Federal Highway Administration (FHWA) published a Rule (National ITS Architecture and Standards) and the Federal Transit Agency (FTA) published a companion Policy to implement Section 5206(e) of the Transportation Equity Act for the 21st Century (TEA-21). This Rule/Policy seeks to foster regional integration by requiring that all ITS projects funded from the Highway Trust Fund be in conformance with the National ITS Architecture and appropriate standards. “Conformance” is defined as using the National ITS Architecture to develop a regional ITS architecture tailored to address the local situation and ITS investment needs, and the subsequent adherence of ITS projects to the regional ITS architecture. The Inland Empire ITS Strategic Plan preceded the Rule/Policy and is, therefore, in need of modifications in order for the region to continue on a path to conformance.

### **3.2 Inland Empire ITS Functional Requirements**

In Chapter 1 of the documentation set for this project, an ITS Inventory for the Inland Empire was presented showing existing and planned (near term) systems owned and / or operated by Inland Empire ITS stakeholders. The next step in the process was to determine the needs of the Stakeholders in the region. A categorized and prioritized list of needs was compared to the inventory to determine which needs are currently being met with existing ITS, will be met in the near future with planned ITS, or are not being met at all. The needs were also captured in comparison to ITS services, or market packages to assess which market packages need to be accommodated in the ultimate architecture. This process and the results are documented in the Chapter 2 deliverable. Also, in that deliverable, was a compilation of the roles and responsibilities (known as Operational Concepts) of the Inland Empire Stakeholders that provide the basis for fulfillment of the ultimate architecture.

The development of functional requirements is the next logical step in the evolution of architecture development. To effectively deliver the ITS services in the Inland Empire region, each system must perform certain functions. A functional requirement is a task or activity that is performed by each system in the region to provide the required regional ITS services. Appendix A and B present the stakeholders and ITS system inventory considered for inclusion in the regional architecture. As time goes on, there are always new systems, revamped systems, and/or deleted systems to consider. Directions for addressing these issues will be handled under the Architecture Maintenance Plan.

Note that the National ITS Architecture does not require functional requirements to be developed for “terminators”. A terminator defines a boundary of the region and generally represents people, other systems, and the general environment that interface to the regional ITS. In the case of the Inland Empire, the terminators are represented by the Arizona DOT ATMS, the Nevada DOT ATMS, and the Riverside/San Bernardino County call boxes.

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\* The Inland Empire is the moniker for the Counties of Riverside and San Bernardino in California.



The lists below (in alphabetical order by stakeholder) detail the primary functional requirements for the major ITS elements in the Inland Empire.

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Stakeholder: **California Department of Motor Vehicles**  
System: **DMV CVO Administration (PrePass)**

This system shall:

- provide administrative capabilities including database management and administrator-to-roadside and administrator-to-administrator interfaces.
- manage the electronic credentials database for a state and interface with roadsides performing credential checks.
- communicate and coordinate with other state commercial vehicle administrations.
- collect and store information on commercial vehicles.
- support the exchange of safety and credentials data among jurisdictions.
- support the exchange of safety and credentials data between agencies (for example, an administrative center and the roadside check facilities) within a single jurisdiction.
- ensure that safety criteria are available for automated roadside safety checks.
- collect and review carrier safety data and determine the carrier safety rating based on supplied criteria.

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Stakeholder: **California Highway Patrol**  
System: **CHP CAD System**

This system shall:

- receive 9-1-1 and 7-digit local access calls.
- collect available information about the caller and the reported emergency.
- forward information about emergency to other systems that formulate and manage the emergency response.
- collect and store emergency information that is collected in the course of emergency operations.
- provide emergency data to operations personnel.
- efficiently dispatch emergency vehicles to an emergency/incident.
- provide safe and efficient routes based on real-time traffic information.
- develop and execute emergency response plans.
- manage overall coordinated response to emergencies.
- track the availability of resources and assist in the appropriate allocation of resources for a particular emergency response.
- provide coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident.



Stakeholder: **California Highway Patrol**  
System: **CHP Vehicles**

This system shall:

- provide two-way communications to support coordinated response to emergencies.
- preempt signals via short range communication directly with traffic control equipment at the roadside.
- provide a direct interface between the emergency vehicle and incident management personnel.

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Stakeholder: **California Department of Transportation District 8**  
System: **D8 Maintenance and Construction (M&C) Management System**

This system shall:

- schedule M&C activities (including work zone activities).
- report M&C activities and status.
- manage M&C resource needs.
- manage M&C vehicle fleet.
- process road network information.
- collect roadside equipment status.
- manage M&C map data.
- operate infrastructure monitoring devices.

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Stakeholder: **California Department of Transportation District 8**  
System: **D8 Roadway Maintenance Vehicles**

This system shall:

- provide dispatch and routing information.
- provide two-way communications to support vehicle tracking.

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Stakeholder: **California Department of Transportation District 8**  
System: **Caltrans D8 Signal Ops**

This system shall:

- monitor and manage the traffic flow at signalized intersections.
- monitor highway-rail intersection equipment at the roadside.
- remotely monitor and report the status of the roadside equipment.
- generate status requests and control plan updates.
- receive periodic status updates in the absence of a request or asynchronously in the event of a detected failure or other unsafe condition at the intersection.
- detect and verify incidents.
- analyze and reduce collected data from traffic surveillance equipment, including planned incidents and hazardous conditions.
- analyze and reduce the collected data from traffic surveillance equipment and develop and implement control plans for signalized intersections.



- develop and implement control plans that coordinate signals at intersections.
- monitor and diagnose field equipment remotely to detect failures, issue problem reports, and track the repair or replacement of the failed equipment.

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Stakeholder: **California Department of Transportation District 8**  
System: **Caltrans D8 Signal Ops Roadside Equipment**

This system shall:

- monitor traffic flow.
- monitor surveillance equipment and interfaces and report detected abnormalities.
- control traffic signals.
- receive vehicle signal priority requests and send requests to traffic signal controllers accordingly.
- monitor the traffic signal equipment and interfaces and report detected abnormalities.
- display traffic information on equipment along the roadway.
- monitor roadside equipment and interfaces and report detected abnormalities.
- provide pre-emption of signalized intersections when activated.

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Stakeholder: **California Department of Transportation District 8**  
System: **Caltrans D8 TMC**

This system shall:

- collect, store, and provide electronic access to traffic surveillance, road weather, and incident data.
- control systems for efficient freeway management including integration of surveillance information with freeway geometry, vehicle control such as ramp metering, electronic signage, and highway advisory radio.
- interface to coordinated traffic systems for information dissemination to the public.
- detect and verify incidents.
- analyze and reduce collected data from traffic surveillance equipment, including planned incidents and hazardous conditions.
- formulate an incident response minimizing the incident potential, incident impacts, and/or resources required for incident management.
- propose and facilitate the dispatch of emergency response and service vehicles as well as coordinate response with all appropriate agencies.
- analyze, control, and optimize area-wide traffic flow.
- communicate with other TMCs to receive and transmit traffic information to other jurisdictions within the region.
- collect and store traffic information that is collected in the course of traffic operations.
- provide traffic data to operations personnel or other data users and archives in the region.
- monitor and diagnosis field equipment remotely to detect failures, issue problem reports, and track the repair or replacement of the failed equipment.





Stakeholder: **California Department of Transportation District 8**  
System: **Caltrans D8 TMC Roadside Equipment**

This system shall:

- monitor traffic flow and road weather information.
- monitor surveillance and roadside equipment and interfaces and report detected abnormalities.
- display traffic information on equipment along the roadway.

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Stakeholder: **California Department of Transportation - Headquarters**  
System: **Caltrans CVO Administration (Pre-pass)**

This system shall:

- provide administrative capabilities including database management and administrator-to-roadside and administrator-to-administrator interfaces.
- manage the electronic credentials database for the state and interface with roadsides performing credential checks.
- communicate and coordinate with other state commercial vehicle administrations.
- collect and store information on commercial vehicles.
- make data available to other data users and archives in the region.

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Stakeholder: **California Department of Transportation - Headquarters**  
System: **CVO Weigh Stations**

This system shall:

- document violations and forward the information to the commercial vehicle if available and to the commercial vehicle administration for processing as part of the normal credentials processing package.
- communicate two-way with approaching properly equipped commercial vehicles at mainline speeds.
- read tags for automated vehicle identification and credential checking.
- appropriately screen all vehicles, not just those that are equipped with tags.
- process data from commercial vehicle along with database information to determine whether a pull-in message is needed.
- generate random pull-in messages with provisions for facility operators and enforcement officials to have manual override capabilities.
- automate the roadside safety inspection process including the use of hand held devices to rapidly inspect the vehicle and driver.
- automate the roadside safety inspection process including the support of automated mainline speed reading of on-board safety data to rapidly screen the vehicle and driver.
- collect, store, maintain, and provide safety data and access historical safety data after receiving identification from vehicles at mainline speeds or while stopped at the roadside.
- write the results of screening and summary safety inspection back onto a tag.
- process safety data and issue pull-in messages or provide warnings to the driver, carrier, and enforcement agencies.
- perform roadside high speed weigh in motion.



Stakeholder: **City of Corona**

System: **Corona TMC**

This system shall:

- collect, store, and provide electronic access to traffic surveillance data.
- monitor highway-rail intersection equipment at the roadside.
- remotely monitor and report the status of the roadside equipment.
- generate status requests and control plan updates.
- receive periodic status updates in the absence of a request or asynchronously in the event of a detected failure or other unsafe condition at the intersection.
- detect and verify incidents.
- analyze and reduce collected data from traffic surveillance equipment, including planned incidents and hazardous conditions.
- formulate an incident response minimizing the incident potential, incident impacts, and/or resources required for incident management.
- analyze, control, and optimize area-wide traffic flow.
- communicate with other TMCs to receive and transmit traffic information to other jurisdictions within the region.
- monitor and manage the traffic flow at signalized intersections.
- analyze and reduce the collected data from traffic surveillance equipment and develop and implement control plans for signalized intersections.
- develop and implement control plans that coordinate signals at intersections.
- collect and store traffic information that is collected in the course of traffic operations.
- provide traffic data to operations personnel or other data users and archives in the region.
- monitor and diagnose field equipment remotely to detect failures, issue problem reports, and track the repair or replacement of the failed equipment.

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Stakeholder: **City of Corona**

System: **Corona Roadside Equipment**

This system shall:

- monitor traffic flow.
- monitor surveillance equipment and interfaces and report detected abnormalities.
- control traffic signals.
- receive vehicle signal priority requests and send requests to traffic signal controllers accordingly.
- monitor the traffic signal equipment and interfaces and report detected abnormalities.
- display traffic information on equipment along the roadway.
- monitor roadside equipment and interfaces and report detected abnormalities.
- manage roadway traffic at highway-rail intersections.
- provide pre-emption of signalized intersections when activated.



Stakeholder: **City of Fontana**  
System: **Fontana Emergency Vehicles**

This system shall:

- provide two-way communications to support coordinated response to emergencies.
- preempt signals via short range communication directly with traffic control equipment at the roadside.
- provide a direct interface between the emergency vehicle and incident management personnel.

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Stakeholder: **City of Fontana**  
System: **Fontana Police Dispatch Center**

This system shall:

- receive 9-1-1 and 7-digit local access.
- collect available information about the caller and the reported emergency.
- propose and facilitate the dispatch of emergency/incident response and service vehicles as well as coordinate response with all appropriate agencies.
- collect and store incident information that is collected in the course of emergency operations.
- provide safe and efficient routes based on real-time traffic information.
- develop and execute emergency response plans.
- manage overall coordinated response to emergencies.
- track the availability of resources and assist in the appropriate allocation of resources for a particular emergency response.
- provide coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident.

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Stakeholder: **City of Fontana**  
System: **Fontana TMC**

This system shall:

- collect, store, and provide electronic access to traffic surveillance data.
- monitor highway-rail intersection equipment at the roadside.
- remotely monitor and report the status of the roadside equipment.
- generate status requests and control plan updates.
- receive periodic status updates in the absence of a request or asynchronously in the event of a detected failure or other unsafe condition at the intersection.
- detect and verify incidents.
- analyze and reduce collected data from traffic surveillance equipment, including planned incidents and hazardous conditions.
- formulate an incident response minimizing the incident potential, incident impacts, and/or resources required for incident management.
- analyze, control, and optimize area-wide traffic flow.
- communicate with other TMCs to receive and transmit traffic information to other jurisdictions within the region.
- monitor and manage the traffic flow at signalized intersections.



- analyze and reduce the collected data from traffic surveillance equipment and develop and implement control plans for signalized intersections.
- develop and implement control plans that coordinate signals at intersections.
- disseminate incident related information to travelers, potential travelers, and private information service providers.
- collect and store traffic information that is collected in the course of traffic operations.
- provide traffic data to operations personnel or other data users and archives in the region.
- monitor and diagnose field equipment remotely to detect failures, issue problem reports, and track the repair or replacement of the failed equipment.

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Stakeholder: **City of Fontana**  
System: **Fontana TMC Roadside Equipment**

This system shall:

- monitor traffic flow.
- monitor surveillance equipment and interfaces and report detected abnormalities.
- control traffic signals.
- receive vehicle signal priority requests and send requests to traffic signal controllers accordingly.
- monitor the traffic signal equipment and interfaces and report detected abnormalities.
- display traffic information on equipment along the roadway.
- monitor roadside equipment and interfaces and report detected abnormalities.
- manage roadway traffic at highway-rail intersections.
- provide pre-emption of signalized intersections when activated.

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Stakeholder: **City of Fontana**  
System: **Fontana Traveler Information**

This system shall:

- collect, process, store, and disseminate traveler information.
- provide media system traffic data interface.
- provide traffic data retrieval interface.
- collect traffic data for advisory messages.
- provide traffic broadcast messages.
- provide traveler kiosk interface.
- provide traveler with event information.

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Stakeholder: **City of Temecula**  
System: **Temecula TOC**

This system shall:

- collect, store, and provide electronic access to traffic surveillance data.
- remotely monitor and report the status of the roadside equipment.
- generate status requests and control plan updates.



- receive periodic status updates in the absence of a request or asynchronously in the event of a detected failure or other unsafe condition at the intersection.
- detect and verify incidents.
- analyze and reduce collected data from traffic surveillance equipment, including planned incidents and hazardous conditions.
- formulate an incident response minimizing the incident potential, incident impacts, and/or resources required for incident management.
- analyze, control, and optimize area-wide traffic flow.
- communicate with other TMCs to receive and transmit traffic information to other jurisdictions within the region.
- monitor and manage the traffic flow at signalized intersections.
- analyze and reduce the collected data from traffic surveillance equipment and develop and implement control plans for signalized intersections.
- develop and implement control plans that coordinate signals at intersections.
- collect and store traffic information that is collected in the course of traffic operations.
- provide traffic data to operations personnel or other data users and archives in the region.
- monitor and diagnose field equipment remotely to detect failures, issue problem reports, and track the repair or replacement of the failed equipment.

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Stakeholder: **City of Temecula**  
System: **Temecula TOC Roadside Equipment**

This system shall:

- monitor traffic flow.
- monitor surveillance equipment and interfaces and report detected abnormalities.
- control traffic signals.
- receive vehicle signal priority requests and send requests to traffic signal controllers accordingly.
- monitor the traffic signal equipment and interfaces and report detected abnormalities.
- display traffic information on equipment along the roadway.
- monitor roadside equipment and interfaces and report detected abnormalities.
- provide pre-emption of signalized intersections when activated.

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Stakeholder: **General Public**  
System: **User Personal Computing Devices**

This system shall:

- provide capability for travelers to receive formatted traffic advisories from their homes, place of work, major trip generation sites, personal portable devices, and over multiple types of electronic media.
- provide basic routing information and allow users to select those transportation modes that allow them to avoid congestion, or more advanced capabilities to allow users to specify those transportation parameters that are unique to their individual needs and receive travel information.
- provide capabilities to receive route planning from the infrastructure at fixed locations such as in their homes, their place of work, and at mobile locations such as from personal portable devices and in the vehicle or perform the route planning process at a mobile information access location.



Stakeholder: **Local Cities and Counties**  
System: **Local and Other Fire Department Systems**

This system shall:

- receive emergency calls.
- collect available information about the caller and the reported emergency.
- forward information on emergency to other systems that formulate and manage the emergency response.
- collect and store emergency information that is collected in the course of emergency operations.
- efficiently dispatch emergency vehicles to an incident.
- track emergency vehicles.
- develop and store emergency response plans.
- manage overall coordinated response to emergencies, as necessary.
- track the availability of resources and assist in the appropriate allocation of resources for a particular emergency response.
- provide coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident.

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Stakeholder: **Local Cities and Counties**  
System: **Local and Other Fire Vehicles**

This system shall:

- track fire vehicle and transmit location to dispatch.
- preempt signals via short range communication directly with traffic control equipment at the roadside.
- provide a direct interface between the emergency vehicle and incident management personnel.

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Stakeholder: **Local Cities and Counties**  
System: **Local City and County Roadside Equipment**

This system shall:

- monitor traffic flow.
- monitor surveillance equipment and interfaces and report detected abnormalities.
- control traffic signals.
- receive vehicle signal priority requests and send requests to traffic signal controllers accordingly.
- monitor the traffic signal equipment and interfaces and report detected abnormalities.
- display traffic information on equipment along the roadway.
- monitor roadside equipment and interfaces and report detected abnormalities.
- provide pre-emption of signalized intersections when activated.



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Stakeholder: **Local Cities and Counties**  
System: **Local City and County Signal Systems**

This system shall:

- collect, store, and provide electronic access to traffic surveillance data.
- remotely monitor and report the status of the roadside equipment.
- generate status requests and control plan updates.
- communicate with other TMCs to receive and transmit traffic information to other jurisdictions within the region.
- monitor and manage the traffic flow at signalized intersections.
- analyze and reduce the collected data from traffic surveillance equipment and develop and implement control plans for signalized intersections.
- develop and implement control plans that coordinate signals at intersections.
- collect and store traffic information that is collected in the course of traffic operations.
- provide traffic data to operations personnel.
- monitor and diagnose field equipment remotely to detect failures, issue problem reports, and track the repair or replacement of the failed equipment.

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Stakeholder: **Local Cities and Counties**  
System: **Local Police and Sheriff Department Systems**

This system shall:

- receive 9-1-1 and 7-digit local access.
- transfer emergency calls to appropriate system.
- collect available information about the caller and the reported emergency.
- forward information on emergency to other systems that formulate and manage the emergency response.
- collect and store emergency/incident information that is collected in the course of emergency operations.
- efficiently dispatch emergency vehicles to an incident.
- develop and execute emergency response plans.
- provide coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident.

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Stakeholder: **Local Cities and Counties**  
System: **Local Police and Sheriff Department Vehicles**

This system shall:

- provide two-way communications to support coordinated response to emergencies.
- preempt signals via short range communication directly with traffic control equipment at the roadside.
- provide a direct interface between the emergency vehicle and incident management personnel.



Stakeholder: **Local Cities and Counties**  
System: **Municipal and Small Transit Agency Systems**

This system shall:

- support use of a fare medium for all applicable regional surface transportation services.
- allow two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis.
- allow fixed-route services to develop, print and disseminate schedules and automatically update customer service operator systems with the most current schedule information.
- monitor transit vehicle locations and determine vehicle schedule adherence.
- collect and store transit information that is collected in the course of transit operations.
- provide transit data to operations personnel.
- provide advanced maintenance functions for the transit property.
- collect operational and maintenance data from transit vehicles, manages vehicle service histories, and monitors drivers and vehicles.
- provide information to proper service personnel to support maintenance activities and records and verify that maintenance work was performed.
- automate and support the assignment of transit vehicles and drivers to enhance the daily operation of a transit service.

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Stakeholder: **Local Cities and Counties**  
System: **Municipal and Small Transit Agency Vehicles**

This system shall:

- use transit vehicle mileage data to automatically generate preventative maintenance schedules for each bus by utilizing vehicle tracking data and storing with a trip computer.
- monitor on board the vehicle in real-time, and transmit information via two-way communication to the management center.
- support use of a fare medium for all applicable regional surface transportation services
- support two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired.
- request signal priority from roadside equipment.
- track transit vehicle and transmit location to dispatch.

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Stakeholder: **Metrolink**  
System: **Metrolink Operations Center**

This system shall:

- support use of a fare medium for all applicable regional surface transportation services.





- allow two-way voice communication between the train vehicle driver and a facility, two-way data communication between the train vehicles and a facility, sensor data to be transmitted from the train vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis.
- allow for services to develop, print and disseminate schedules and automatically update customer service operator systems with the most current schedule information.
- use current vehicle schedule adherence and optimum scenarios for schedule adjustment.
- provide information to customers at transit stops and other public transportation areas before they embark and on-board the transit vehicle once they are enroute.
- support schedule coordination between transit properties.
- monitor train locations and determine vehicle schedule adherence.
- collect and store vehicle information that is collected in the course of operations.
- provide train data to operations personnel.
- provide advanced maintenance functions.
- collect operational and maintenance data from vehicles, manage service histories, and monitor drivers and vehicles.
- provide information to proper service personnel to support maintenance activities and records and verify that maintenance work was performed.

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Stakeholder: **Metrolink**  
System: **Metrolink Trains**

This system shall:

- monitor on board the vehicle in real-time, and transmit information via two-way communication to the management center.
- collect data required to determine accurate ridership levels and support fare structures.
- support use of a fare medium for all applicable regional surface transportation services.
- support two-way voice communication between the train vehicle driver and a facility, two-way data communication between the train vehicles and a facility, sensor data to be transmitted from the train vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired.
- monitor the safety of transit vehicles using on-board safety sensors, processors and communications from on-board system.
- track vehicle and transmit location to central.

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Stakeholder: **Omnitrans**  
System: **Omnitrans Fixed Route**

This system shall:

- support use of a fare medium for all applicable regional surface transportation services.
- allow two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis.



- allow fixed-route services to develop, print and disseminate schedules and automatically update customer service operator systems with the most current schedule information.
- monitor transit vehicle locations and determine vehicle schedule adherence.
- collect and store transit information that is collected in the course of transit operations.
- provide transit data to operations personnel.
- provide advanced maintenance functions for the transit property.
- collect operational and maintenance data from transit vehicles, manages vehicle service histories, and monitors drivers and vehicles.
- provide information to proper service personnel to support maintenance activities and records and verify that maintenance work was performed.
- automate and support the assignment of transit vehicles and drivers to enhance the daily operation of a transit service.
- automate planning and scheduling by collecting data for schedule generation.
- automatically determine optimum scenarios for schedule adjustment.
- use transit vehicle mileage data to automatically generate preventative maintenance schedules for each bus by utilizing vehicle tracking data.
- collect data required to determine accurate ridership levels and implement fare structures.
- monitor the safety of transit vehicles using on-board safety sensors, processors and communications from on-board system.
- support fleet management with automated mileage and fuel reporting and auditing.
- track transit vehicle and transmit location to dispatch.
- provide information to customers at transit stops and other public transportation areas before they embark and on-board the transit vehicle once they are enroute.
- communicate with other TMCs to receive traffic information and transmit transit data to other jurisdictions within the region.

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Stakeholder: **Omnitrans**

System: **Omnitrans Paratransit**

This system shall:

- track transit vehicle and transmit location to dispatch.
- manage transit vehicle operations data
- process demand responsive transit trip request.
- compute demand responsive transit vehicle availability.
- generate demand responsive transit schedule and routes.
- confirm demand responsive transit schedule and route.
- process demand responsive transit vehicle availability data.
- provide demand responsive transit driver interface automate planning and scheduling by collecting data for schedule generation.
- support two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, on-board safety sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis.
- support fleet management with automated mileage and fuel reporting and auditing.



Stakeholder: **Omnitrans**  
System: **Omnitrans Transit Vehicles**

This system shall:

- use transit vehicle mileage data to automatically generate preventative maintenance schedules for each vehicle by utilizing vehicle tracking data.
- monitor on board the vehicle in real-time, and transmit information via two-way communication to the management center.
- collect data required to determine accurate ridership levels and implement fare structures.
- support use of a fare medium for all applicable regional surface transportation services.
- support two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired.
- monitor the safety of transit vehicles using on-board safety sensors, processors and communications from on-board system.
- request signal priority from equipment on the roadside.
- transmit location to dispatch.

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Stakeholder: **Partners for Advanced Transit and Highways (PATH)**  
System: **Performance Monitoring System (PeMS)**

This system shall:

- collect data from multiple data sources.
- store data in a focused repository.
- perform quality checks on the incoming data, error notification, and archive to archive coordination.
- collect a focused set of data and serve a particular user community.
- collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region.
- provide advanced data analysis, predictions, summarization, and mining features that facilitate discovery of information, patterns, and correlations in large data sets.
- collect and archive traffic, roadway, and environmental information for use in off-line planning, research, and analysis.

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Stakeholder: **Private Commercial Vehicle Owners**  
System: **Commercial Vehicles**

This system shall:

- provide commercial vehicle driver communications.
- communicate commercial vehicle on-board data to roadside.
- collect on-board commercial vehicle sensor data.
- communicate commercial vehicle on-board data to vehicle manager.
- process vehicle location data.



Stakeholder: **Private Tow Companies**  
System: **Tow Trucks (FSP)**

This system shall:

- track vehicle.
- provide emergency personnel interface.

---

Stakeholder: **Railroad Operators**  
System: **Rail Grade Crossing Warning Equipment**

This system shall:

- process traffic sensor data.
- control Highway Rail Intersection (HRI) traffic signals.
- control HRI warnings and barriers.
- perform equipment self-test.
- provide closure parameters.
- report HRI status on approach.
- interact with roadside systems.
- determine HRI status.
- exchange data with Traffic Management.

---

Stakeholder: **Riverside Transportation County Commission**  
System: **North Main Corona Metrolink Parking Management System**

This system shall:

- collect and store parking information that is collected in the course of parking system operations.
- support electronic payment of parking fees.
- detect and classify properly equipped vehicles entering and exiting the parking facility
- maintain information on parking availability and pricing structure information.
- enable processing of financial transactions and external coordination.
- detect and classify vehicles entering and exiting the parking facility.
- measure parking facility occupancy to support parking operations and traveler information services.
- disseminate parking information to travelers, roadside equipment, and private information service providers.

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Stakeholder: **Riverside Transportation County Commission**  
System: **RidePro**

This system shall:

- collect, process, store, and disseminate traveler ridematching information.
- maintain a database of travelers and their work routes and provide connectivity between travelers taking similar routes.
- provide dynamic rideshare matches including rider and driver information and reservations.
- collect and store traveler information that is collected in the course of ridematching operation.



---

Stakeholder: **Riverside Transportation County Commission**  
System: **Riverside County Smart Call Boxes**

This system shall:

- collect traffic speed data.
- transmit data back to a central facility at regular intervals.

---

Stakeholder: **Riverside Transportation County Commission**  
System: **Riverside Freeway Service Patrol**

This system shall:

- perform administrative functions such as accounting, monitoring, and receiving statistics from providers.

---

Stakeholder: **Riverside Transit Agency**  
System: **RTA Fixed Route**

This system shall:

- support use of a fare medium for all applicable regional surface transportation services.
- allow two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis.
- allow fixed-route services to develop, print and disseminate schedules and automatically update customer service operator systems with the most current schedule information.
- monitor transit vehicle locations and determine vehicle schedule adherence.
- collect and store transit information that is collected in the course of transit operations.
- provide transit data to operations personnel.
- provide advanced maintenance functions for the transit property.
- collect operational and maintenance data from transit vehicles, manages vehicle service histories, and monitors drivers and vehicles.
- provide information to proper service personnel to support maintenance activities and records and verify that maintenance work was performed.
- automate and support the assignment of transit vehicles and drivers to enhance the daily operation of a transit service.
- automate planning and scheduling by collecting data for schedule generation.
- automatically determine optimum scenarios for schedule adjustment.
- use transit vehicle mileage data to automatically generate preventative maintenance schedules for each bus by utilizing vehicle tracking data.
- collect data required to determine accurate ridership levels and implement fare structures.
- monitor the safety of transit vehicles using on-board safety sensors, processors and communications from on-board system.
- support fleet management with automated mileage and fuel reporting and auditing.
- track transit vehicle and transmit location to dispatch.



- provide information to customers at transit stops and other public transportation areas before they embark and on-board the transit vehicle once they are enroute.
- communicate with other TMCs to receive traffic information and transmit transit data to other jurisdictions within the region.

---

Stakeholder: **Riverside Transit Agency**

System: **RTA Paratransit**

This system shall:

- track transit vehicle and transmit location to dispatch.
- manage transit vehicle operations data
- process demand responsive transit trip request.
- compute demand responsive transit vehicle availability.
- generate demand responsive transit schedule and routes.
- confirm demand responsive transit schedule and route.
- process demand responsive transit vehicle availability data.
- provide demand responsive transit driver interface automate planning and scheduling by collecting data for schedule generation.
- support two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, on-board safety sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis.
- support fleet management with automated mileage and fuel reporting and auditing.

---

Stakeholder: **Riverside Transit Agency**

System: **RTA Transit Vehicles**

This system shall:

- use transit vehicle mileage data to automatically generate preventative maintenance schedules for each vehicle by utilizing vehicle tracking data.
- monitor on board the vehicle in real-time, and transmit information via two-way communication to the management center.
- collect data required to determine accurate ridership levels and implement fare structures.
- support use of a fare medium for all applicable regional surface transportation services.
- support two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired.
- monitor the safety of transit vehicles using on-board safety sensors, processors and communications from on-board system.
- request signal priority from equipment on the roadside.
- transmit location to dispatch.



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Stakeholder: **San Bernardino Associated Governments**  
System: **Inland Empire Call Answering Center**

This system shall:

- receive transferred emergency calls.
- collect available information about the caller and the reported emergency.
- forward information on emergency to other systems that formulate and manage the emergency response.
- collect and store emergency information that is collected in the course of emergency operations.
- efficiently dispatch emergency vehicles to an incident.
- track service patrol vehicles.
- provide emergency data to operations personnel.
- develop and execute emergency response plans.
- manage overall coordinated response to emergencies.
- provide coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident.

---

Stakeholder: **San Bernardino Associated Governments**  
System: **Smart Call Boxes**

This system shall:

- collect traffic speed data.
- transmit data back to a central facility at regular intervals.

---

Stakeholder: **San Bernardino Associated Governments**  
System: **San Bernardino Freeway Service Patrol**

This system shall:

- perform administrative functions such as accounting, monitoring, and receiving statistics from providers.

---

Stakeholder: **Southern California Association of Governments (SCAG)**  
System: **Regional Archived Data Repository**

This system shall:

- collect data from multiple data sources.
- store data in a focused repository.
- perform quality checks on the incoming data, error notification, and archive to archive coordination.
- collect a focused set of data and serve a particular user community.
- collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region.



- provide advanced data analysis, summarization, and mining features that facilitate discovery of information, patterns, and correlations in large data sets.
- collect and archive traffic, roadway, and environmental information for use in off-line planning, research, and analysis.

---

Stakeholder: **Southern California Economic Partnership**

System: **Travel Advisory News Network**

This system shall:

- provide media system traffic data interface.
- provide traffic data retrieval interface.
- collect traffic data for information service provider and advisory messages.
- provide traffic broadcast messages.
- provide traveler with event information.
- collect, process, store, and disseminate traveler information.
- provide interactive traveler information.
- send formatted traffic advisories including accurate traveling information concerning available travel options and their availability, and congestion information at kiosks.
- provide information tailored for individual users.

---

Stakeholder: **SunLine Transit Agency**

System: **SunLine Fixed Route**

This system shall:

- support use of a fare medium for all applicable regional surface transportation services.
- allow two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis.
- allow fixed-route services to develop, print and disseminate schedules and automatically update customer service operator systems with the most current schedule information.
- monitor transit vehicle locations and determine vehicle schedule adherence.
- collect and store transit information that is collected in the course of transit operations.
- provide transit data to operations personnel.
- provide advanced maintenance functions for the transit property.
- collect operational and maintenance data from transit vehicles, manages vehicle service histories, and monitors drivers and vehicles.
- provide information to proper service personnel to support maintenance activities and records and verify that maintenance work was performed.
- automate and support the assignment of transit vehicles and drivers to enhance the daily operation of a transit service.
- automate planning and scheduling by collecting data for schedule generation.
- automatically determine optimum scenarios for schedule adjustment.
- use transit vehicle mileage data to automatically generate preventative maintenance schedules for each bus by utilizing vehicle tracking data.





- collect data required to determine accurate ridership levels and implement fare structures.
- monitor the safety of transit vehicles using on-board safety sensors, processors and communications from on-board system.
- support fleet management with automated mileage and fuel reporting and auditing.
- track transit vehicle and transmit location to dispatch.
- provide information to customers at transit stops and other public transportation areas before they embark and on-board the transit vehicle once they are enroute.
- communicate with other TMCs to receive traffic information and transmit transit data to other jurisdictions within the region.

---

Stakeholder: **SunLine Transit Agency**

System: **SunLine Paratransit**

This system shall:

- track transit vehicle and transmit location to dispatch.
- manage transit vehicle operations data
- process demand responsive transit trip request.
- compute demand responsive transit vehicle availability.
- generate demand responsive transit schedule and routes.
- confirm demand responsive transit schedule and route.
- process demand responsive transit vehicle availability data.
- provide demand responsive transit driver interface automate planning and scheduling by collecting data for schedule generation.
- support two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, on-board safety sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis.
- support fleet management with automated mileage and fuel reporting and auditing.

---

Stakeholder: **SunLine Transit Agency**

System: **SunLine Transit Vehicles**

This system shall:

- use transit vehicle mileage data to automatically generate preventative maintenance schedules for each vehicle by utilizing vehicle tracking data.
- monitor on board the vehicle in real-time, and transmit information via two-way communication to the management center.
- collect data required to determine accurate ridership levels and implement fare structures.
- support use of a fare medium for all applicable regional surface transportation services.
- support two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired.
- monitor the safety of transit vehicles using on-board safety sensors, processors and communications from on-board system.



- request signal priority from equipment on the roadside.
- transmit location to dispatch.

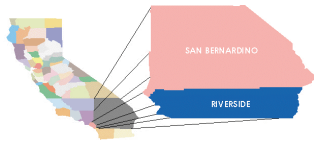
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Stakeholder: **TV, Radio, and Other Media Outlets**

System: **Media**

This system shall:

- collect, process, store, and disseminate traveler information such as congestion, incidents, special events, road closure, detour routing, weather, parking, and roadway maintenance information.
- maintain a database of local area transportation services available to travelers with up-to-the-minute information.
- provide users with real-time travel related information en-route to assist the travelers in making decisions about trips.
- provide interactive traveler information.
- send formatted traffic advisories including accurate traveling information concerning available travel options and their availability, and congestion information at kiosks.
- provide the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, and special events.
- provide information tailored for individual users.



### **3.3 Inland Empire ITS Interconnects and Information Flows**

At this point in the project, ITS in the Inland Empire region has been identified and defined in terms of the functions they perform. The next step is to identify the connections between the systems, creating the framework that supports the exchange of information.

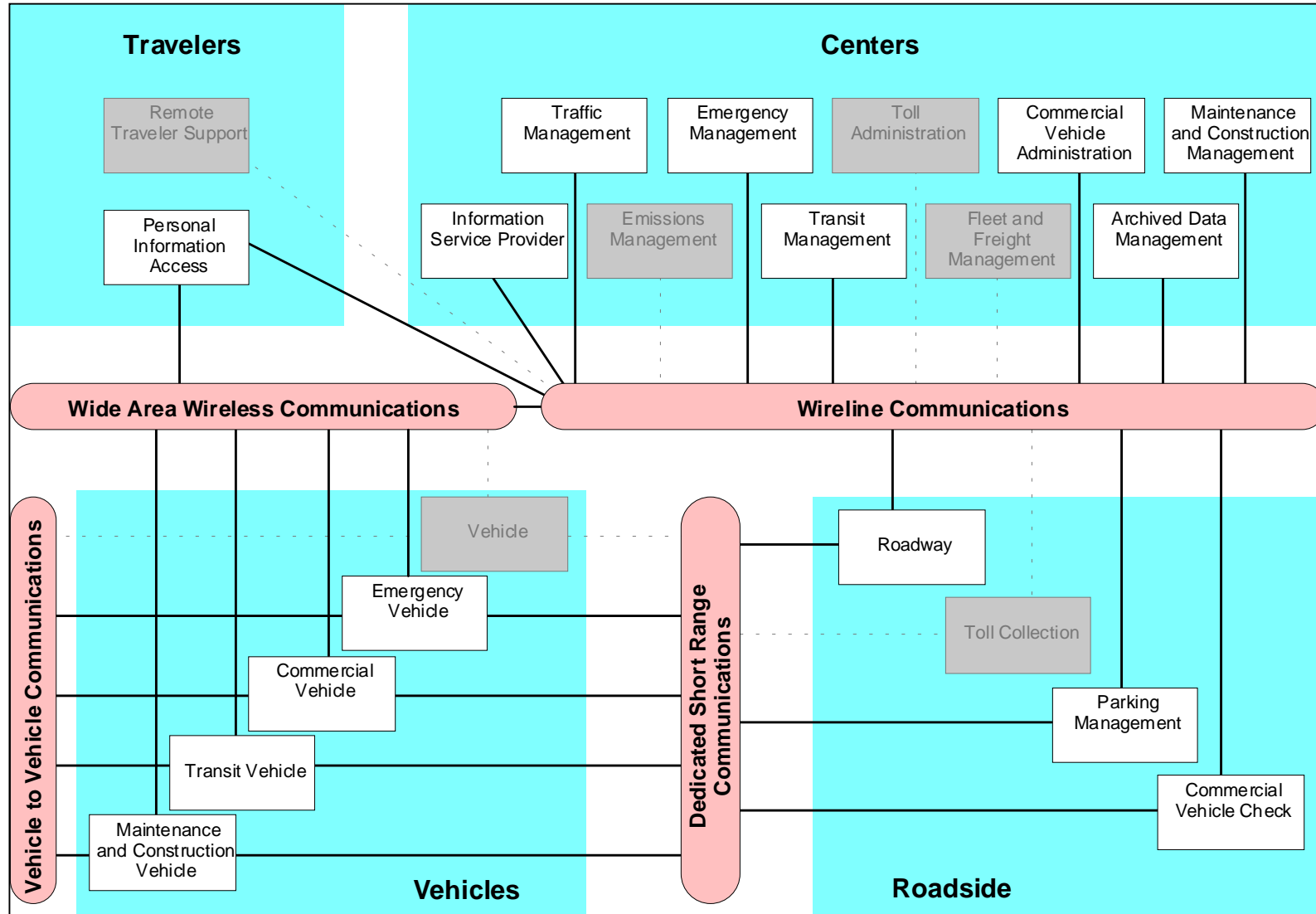
A software tool, called Turbo Architecture, was used to identify the interconnects between ITS elements in order to support the selected services (or market packages) for which the Inland Empire region has identified needs. Standard outputs from Turbo Architecture include lists of the region’s stakeholders and their respective ITS elements, as well as diagrams representing interconnections between ITS elements and the information flows depicted by the interconnections.

**Figure 3-1** presents the Inland Empire ITS interconnects on a single diagram, sometimes called a “sausage diagram”. The sausage diagram depicts all of the ITS subsystems identified in the National ITS Architecture and the basic communication channels between these subsystems. Figure 3-1 shows the relevant subsystems identified for the Inland Empire, noting by gray shading those subsystems that are not part of the region’s existing or planned deployment.

Each subset of the interconnects showing the connections between each stakeholders system and the other ITS elements in the region are shown in **Appendix C** of this Report. In addition, right after each Interconnect Diagram, the relevant Architecture Flow, or information flow, which represents the information that is exchanged between the ITS elements to support the region’s desired services is included.



Figure 3-1. Inland Empire Regional Architecture ITS Subsystems





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### **3.4 Next Steps**

This draft Functional Requirements and Interface Definition Report has been completed based on analysis of the Inland Empire inventory, needs, and services. The Inland Empire ITS stakeholders are asked to review this report with a critical eye for accuracy and representation of their input. Comments are requested back to the consultant team by May 14, 2003. Comments will be dispositioned and this report will be fine-tuned as a chapter in the Final Report.



### List of Acronyms

AD	Archived Data
ADUS	Archived Data User Service
APTS	Advanced Public Transportation Systems
ATIS	Advanced Traveler Information System
ATMS	Advanced Traffic Management System
AVI	Automated Vehicle Identification
AVL	Automated Vehicle Locator
AVSS	Advanced Vehicle Safety Systems
CAD	Computer Aided Dispatch
Caltrans	California Department of Transportation
CCTV	Closed Circuit Television
CVISN	Commercial Vehicle Information Systems & Networks
CVO	Commercial Vehicle Operations
CHP	California Highway Patrol
CMS	Changeable Message Sign
DOT	Department of Transportation
EM	Emergency Management
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FSP	Freeway Service Patrol
FTA	Federal Transit Authority
HAR	Highway Advisory Radio
HOV	High Occupancy Vehicles
ISP	Information Service Provider
ITS	Intelligent Transportation System(s)
MCO	Maintenance & Construction Operations
MOU	Memorandum of Understanding
MPO	Metropolitan Planning Organization
RCTC	Riverside County Transportation Commission
RTA	Riverside Transit Authority
RWIS	Road Weather Information System
SANBAG	San Bernardino Association of Governments
SCAG	Southern California Association of Governments
TMC	Traffic Management Center
TMC	Transportation Management Center
TOC	Traffic Operations Center
TOC	Transportation Operations Center

**APPENDIX A**  
STAKEHOLDER REPORT  
(FROM TURBO ARCHITECTURE TOOL)



### **Arizona DOT (ADOT)**

*Description:* This stakeholder represents the State of Arizona in interstate ITS interactions between California and Arizona.

*Associated Element:* Arizona DOT (ADOT) ATMS

### **California Department of Motor Vehicles (DMV)**

*Description:* This stakeholder represents the state in commercial vehicle licensing, credentialing and other administrative and taxation functions that do not fall under the purview of Caltrans.

*Associated Element:* DMV CVO Administration (PrePass)

### **California Highway Patrol (CHP)**

*Description:* The CHP provides law enforcement and traffic safety and management services on state and county roadways. The CHP also provides the following services: commercial vehicle safety inspections and enforcement activities at truck scales on state highways; dispatches FSP vehicles; answers and responds to calls from roadside call boxes; answers and responds to calls from cellular phone users.

*Associated Element:* CHP CAD System

*Associated Element:* CHP Vehicles

### **Caltrans D-8**

*Description:* This stakeholder represents Caltrans' functions that take place on the local, or District level - specifically District 8. This includes District level planning, operations, maintenance and local agency coordination.

*Associated Element:* Caltrans D-8 Maintenance and Construction Mgmt System

*Associated Element:* Caltrans D-8 Roadway Maintenance Vehicles

*Associated Element:* Caltrans D-8 Signal Ops

*Associated Element:* Caltrans D-8 Signal Ops Roadside Equipment

*Associated Element:* Caltrans D-8 TMC

*Associated Element:* Caltrans D-8 TMC Roadside Equipment

### **Caltrans HQ**

*Description:* This stakeholder represents Caltrans' functions that take place on a statewide level, or other functions that are not handled at the District level - specifically District 8.

*Associated Element:* Caltrans CVO Administration (Pre-pass)

*Associated Element:* CVO Weigh Stations (including weigh-in-motion)

### **City of Corona**

*Description:* The City of Corona is located in far western Riverside County near the Riverside/Orange County line. Corona is planning and implementing an extensive Advanced Transportation Management System (ATMS) that will interface with Caltrans District 8 transportation management systems.

*Associated Element:* Corona TMC

*Associated Element:* Corona TMC Roadside Equipment

### **City of Fontana**

*Description:* The City of Fontana is located in the San Bernardino Valley area of San Bernardino County. Fontana is planning and implementing an extensive Advanced Transportation Management System (ATMS) that will interface with Caltrans District 8 transportation management systems. The Fontana police department computer aided dispatch (CAD) system and automated vehicle location (AVL) system are also interacting with the City ATMS.

*Associated Element:* Fontana Emergency Vehicles

*Associated Element:* Fontana Police Dispatch Center

*Associated Element:* Fontana TMC

*Associated Element:* Fontana TMC Roadside Equipment

*Associated Element:* Fontana Traveler Information





### **City of Temecula**

*Description:* The City of Temecula is located in the far southwestern corner of Riverside County near the Riverside/San Diego County line. Temecula is planning and implementing an extensive Advanced Transportation Management System (ATMS) that will interface with Caltrans District 8 transportation management systems. Information provided by Ali Moghadam (909) 964-6411.

*Associated Element:* Temecula TOC

*Associated Element:* Temecula TOC Roadside Equipment

### **General Public**

*Description:* This stakeholder represents the public as travelers requesting and receiving travel and traffic information.

*Associated Element:* User Personal Computing Devices

### **Local Cities and Counties**

*Description:* This stakeholder generically represents the cities in the Inland Empire that own and operate signal systems but are not currently performing, nor planning on any unique external ITS interfaces to other systems or agencies. This stakeholder also represents the local law enforcement and public safety agencies that are within the purview of the local agencies. In some instances, this stakeholder also represents "municipal" transit operators.

*Associated Element:* Local and other Fire Departments Systems

*Associated Element:* Local and other Fire Vehicles

*Associated Element:* Local City and County Roadside Equipment

*Associated Element:* Local City and County Signal Systems

*Associated Element:* Local Police and Sheriff Departments Systems

*Associated Element:* Local Police and Sheriff Dept Vehicles

*Associated Element:* Municipal and small transit agencies systems

*Associated Element:* Municipal and small transit agencies vehicles

### **Metrolink**

*Description:* Metrolink is the "brand name" for the regional commuter rail service provided by the Southern California Regional Rail Authority, a multi-county joint powers authority. Metrolink operates service between the Inland Empire and Los Angeles County and between the Inland Empire and Orange County. Information provided by Richard Shockley (213) 452-0205

*Associated Element:* Metrolink Operations Center

*Associated Element:* Metrolink Trains

### **Nevada DOT (NDOT)**

*Description:* This stakeholder represents the State of Nevada in interstate ITS interactions between California and Nevada.

*Associated Element:* Nevada DOT (NDOT) ATMS

### **Omnitrans**

*Description:* Omnitrans is a joint powers authority that operates fixed route transit and paratransit services in San Bernardino County, primarily in the San Bernardino Valley area. Information provided by Cindy Peterson (909) 379-7211.

*Associated Element:* Omnitrans Fixed Route

*Associated Element:* Omnitrans Paratransit

*Associated Element:* Omnitrans Transit Vehicles

### **Partners for Advanced Transit and Highways (PATH)**

*Description:* PATH is a technical and policy research organization composed primarily of Caltrans and the University of California.

*Associated Element:* Performance Monitoring System (PeMS)

### **Private Commercial Vehicle Owners**

*Description:* This stakeholder generically represents the owners and / or operators of private commercial vehicles. Their primary interaction in this architecture is in the operation and credentialing of commercial vehicles.

*Associated Element:* Commercial Vehicles



### **Private Tow Companies**

*Description:* This stakeholder generically represents the private sector owners and / or operators of tow trucks used for Freeway Service Patrol (FSP) on Inland Empire freeways.

*Associated Element:* Tow Trucks (FSP)

### **Railroad Operators**

*Description:* This stakeholder represents the primary railroad operators in the Inland Empire (Union Pacific, BNSF and Metrolink) that own and or operate and or maintain rail grade crossing warning equipment, also known as wayside equipment.

*Associated Element:* Rail Grade Crossing Warning Eqpt.

### **Riverside County Transportation Commission (RCTC)**

*Description:* This stakeholder is the "County Transportation Commission" for Riverside County. RCTC is primarily a planning and programming agency for the county, operating few transportation assets. RCTC administers and funds the County Call Box Program and the County Freeway Service Patrol (FSP) Program. Information provided (primarily) by Jerry Rivera, (909) 787-7141.

*Associated Element:* North Main Corona Metrolink Station Pkg Mgmt System

*Associated Element:* Ride Pro

*Associated Element:* Riverside County Call Boxes

*Associated Element:* Riverside County Smart Call Boxes

*Associated Element:* Riverside Freeway Service Patrol

### **Riverside Transit Agency (RTA)**

*Description:* RTA is a joint powers authority that operates fixed route transit and paratransit services in Riverside County, primarily in the western and southwestern portions of the County. Information provided by Anne Palatino (909) 565-5130.

*Associated Element:* RTA Fixed Route

*Associated Element:* RTA Paratransit

*Associated Element:* RTA Transit Vehicles

### **San Bernardino Associated Governments (SANBAG)**

*Description:* This stakeholder is the "County Transportation Commission" for San Bernardino County. SANBAG is primarily a planning and programming agency for the county, operating few transportation assets. SANBAG administers and funds the County Call Box Program and the planned County Freeway Service Patrol (FSP) Program. Information provided by Michelle Kirkhoff (909) 884-8276.

*Associated Element:* Inland Empire Call Answering Center

*Associated Element:* San Bernardino County Call Boxes

*Associated Element:* San Bernardino County Smart Call Boxes

*Associated Element:* San Bernardino Freeway Service Patrol

### **Southern California Association of Governments (SCAG)**

*Description:* This stakeholder is the federally designated Metropolitan Planning Organization (MPO) for the six county Southern California Region, of which the Inland Empire is a part. SCAG is primarily a planning and programming agency for the Region, operating few transportation assets.

*Associated Element:* Regional Archived Data Repository

### **Southern California Economic Partnership**

*Description:* This stakeholder is a public/private partnership that promotes the development and implementation of advanced transportation technologies in the Southern California Region. Their primary interaction in this architecture is as an information service provider - collecting and disseminating transportation and traffic-related information.

*Associated Element:* Traveler Advisory News Network (TANN)



### **SunLine Transit Agency**

*Description:* SunLine is a joint powers authority that operates fixed route transit and paratransit services in Riverside County, primarily in the Coachella Valley area of the County.

*Associated Element:* SunLine Fixed Route

*Associated Element:* SunLine Paratransit

*Associated Element:* SunLine Transit Vehicles

### **TV, radio and other media outlets (Internet, kiosks, etc.)**

*Description:* This stakeholder represents media outlets that disseminate travel and traffic information to the general public. These outlets generally provide information "free" to the public at large. Though, some outlets may provide a "premium" service at some cost to the individual.

*Associated Element:* Media

**APPENDIX B**  
INVENTORY REPORT  
(FROM TURBO ARCHITECTURE TOOL)



**Arizona DOT (ADOT) ATMS**

*Status:* Planned

*Associated Stakeholder:* Arizona DOT (ADOT)

*Description:* Represents communications and interactions (electronic and manual) between Caltrans and ADOT for coordination of traffic management across the California/Arizona State line.

*Mapped to Entity:* Other TM

**Caltrans CVO Administration (Pre-pass)**

*Status:* Existing

*Associated Stakeholder:* Caltrans HQ

*Description:* California uses PrePass for automated CVO clearance (credentialing and enforcement) at selected CVO weigh stations. The CVO program is a statewide program administered by Caltrans HQ, and the DMV.

*Mapped to Entity:* Commercial Vehicle Administration

*Mapped to Entity:* Other CVAS

**Caltrans D-8 Maintenance and Construction Mgmt System**

*Status:* Existing

*Associated Stakeholder:* Caltrans D-8

*Description:* This software system identifies potential conflicts in planning for work zone activity, more from a calendar perspective. It allows Caltrans D-8 to see what is going on in a specific area so that they can manage and coordinate maintenance and construction projects. This information is gathered about construction and conveyed to the public via the D-8 website.

*Mapped to Entity:* Maintenance and Construction Management

*Mapped to Entity:* Other MCM

**Caltrans D-8 Roadway Maintenance Vehicles**

*Status:* Existing

*Associated Stakeholder:* Caltrans D-8

*Description:* These vehicles would be used to clear snow, oil/roadway spills, etc... This system may currently be mostly voice communications currently but, there is a desire to reflect these communications in the architecture.

*Mapped to Entity:* Other MCV

*Mapped to Entity:* Maintenance and Construction Vehicle

**Caltrans D-8 Signal Ops**

*Status:* Existing

*Associated Stakeholder:* Caltrans D-8

*Description:* Documents Arterial Traffic Management System(s) owned and /or operated by Caltrans District 8. Information provided by Mohammed Bendelhoum.

*Mapped to Entity:* Traffic Management

*Mapped to Entity:* Other TM

**Caltrans D-8 Signal Ops Roadside Equipment**

*Status:* Existing

*Associated Stakeholder:* Caltrans D-8

*Description:* Represents roadside equipment used in the operation, management and monitoring of Caltrans traffic signal operations.

*Mapped to Entity:* Other Roadway

*Mapped to Entity:* Roadway Subsystem



### **Caltrans D-8 TMC**

*Status:* Existing

*Associated Stakeholder:* Caltrans D-8

*Description:* Represents the centralized traffic management functions (primarily freeway operations) owned and / or operated by Caltrans. Also includes traffic counts (and potentially speed data in the future) from Smart Call Boxes administered by SANBAG and RCTC. Information provided by Mohammed Bendelhoum - Branch Chief, Freeway Systems (909) 383-6452, and SANBAG and RCTC. .

*Mapped to Entity:* Information Service Provider

*Mapped to Entity:* Other Archives

*Mapped to Entity:* Archived Data Management Subsystem

*Mapped to Entity:* Other ISP

*Mapped to Entity:* Other TM

*Mapped to Entity:* Traffic Management

### **Caltrans D-8 TMC Roadside Equipment**

*Status:* Existing

*Associated Stakeholder:* Caltrans D-8

*Description:* Represents roadside equipment used in the operation, management and monitoring of Caltrans' freeway management system(s). Roadside Equipment includes any and all equipment distributed on and along the roadway that monitors and controls traffic, or disseminates en-route traveler information. This can include equipment for tolling.

*Mapped to Entity:* Other Roadway

*Mapped to Entity:* Roadway Subsystem

### **CHP CAD System**

*Status:* Existing

*Associated Stakeholder:* California Highway Patrol (CHP)

*Description:* Represents the CHP CAD and dispatch functions and system(s). California Highway Patrol is co-located with Caltrans in the District 8 TMC.

*Mapped to Entity:* Emergency Management

*Mapped to Entity:* Other EM

### **CHP Vehicles**

*Status:* Existing

*Associated Stakeholder:* California Highway Patrol (CHP)

*Description:* Represents the field assets of the CHP.

*Mapped to Entity:* Emergency Vehicle Subsystem

### **Commercial Vehicles**

*Status:* Existing

*Associated Stakeholder:* Private Commercial Vehicle Owners

*Description:* Represents Commercial Vehicles that would interact with PrePass and other CVO credentialing and administrative systems.

*Mapped to Entity:* Commercial Vehicle Subsystem

### **Corona TMC**

*Status:* Existing

*Associated Stakeholder:* City of Corona

*Description:* Represents the centralized traffic management functions (primarily arterial traffic management operations) owned and / or operated by the City of Corona. Information provided by Rusty Beardsley - (909) 736-2467.

*Mapped to Entity:* Information Service Provider

*Mapped to Entity:* Traffic Management

*Mapped to Entity:* Other TM

*Mapped to Entity:* Other ISP



**Corona TMC Roadside Equipment**

*Status:* Existing

*Associated Stakeholder:* City of Corona

*Description:* Represents roadside equipment used in the operation, management and monitoring of Corona's emerging advanced traffic management system(s). Roadside Equipment includes any and all equipment distributed on and along the roadway that monitors and controls traffic, or disseminates en-route traveler information.

*Mapped to Entity:* Other Roadway

*Mapped to Entity:* Roadway Subsystem

**CVO Weigh Stations (including weigh-in-motion)**

*Status:* Existing

*Associated Stakeholder:* Caltrans HQ

*Description:* Represents CVO weigh stations - primarily those that utilize PrePass for commercial vehicle screening and clearance.

*Mapped to Entity:* Commercial Vehicle Check

**DMV CVO Administration (PrePass)**

*Status:* Existing

*Associated Stakeholder:* California Department of Motor Vehicles (DMV)

*Description:* California uses PrePass for automated CVO clearance (credentialing and enforcement) at selected CVO weigh stations. The CVO program is a statewide program administered by Caltrans HQ, and the DMV.

*Mapped to Entity:* Other CVAS

*Mapped to Entity:* Commercial Vehicle Administration

**Fontana Emergency Vehicles**

*Status:* Existing

*Associated Stakeholder:* City of Fontana

*Description:* Represents Fontana police department vehicles (and possibly other emergency response vehicles) that are equipped with AVL.

*Mapped to Entity:* Emergency Vehicle Subsystem

**Fontana Police Dispatch Center**

*Status:* Existing

*Associated Stakeholder:* City of Fontana

*Description:* Represents the Fontana police CAD system and the interactions between the police dispatch function(s) and the City ATMS and ATIS.

*Mapped to Entity:* Other EM

*Mapped to Entity:* Emergency Management

**Fontana TMC**

*Status:* Existing

*Associated Stakeholder:* City of Fontana

*Description:* Represents the centralized traffic management functions (primarily arterial traffic management operations) owned and / or operated by the City of Fontana. Information provided by

*Mapped to Entity:* Traffic Management

*Mapped to Entity:* Information Service Provider

*Mapped to Entity:* Other TM

*Mapped to Entity:* Other ISP



**Fontana TMC Roadside Equipment**

*Status:* Existing

*Associated Stakeholder:* City of Fontana

*Description:* Represents roadside equipment used in the operation, management and monitoring of Fontana's advanced traffic management system(s). Roadside Equipment includes any and all equipment distributed on and along the roadway that monitors and controls traffic, or disseminates en-route traveler information.

*Mapped to Entity:* Other Roadway

*Mapped to Entity:* Roadway Subsystem

**Fontana Traveler Information**

*Status:* Existing

*Associated Stakeholder:* City of Fontana

*Description:* Represents traveler information disseminated to the public that is compiled from data contained within the Fontana TMC/ATMS.

*Mapped to Entity:* Information Service Provider

*Mapped to Entity:* Other ISP

**Inland Empire Call Answering Center**

*Status:* Existing

*Associated Stakeholder:* San Bernardino Associated Governments (SANBAG)

*Description:* This Element is a call answering center in which all emergency call box calls from Riverside and San Bernardino Counties are answered. This Center routes the emergency calls to the appropriate one of three CHP dispatch centers; and non-emergency calls to either a towing service or a family member of the person requesting assistance.

*Mapped to Entity:* Other EM

*Mapped to Entity:* Emergency Management

**Local and other Fire Departments Systems**

*Status:* Existing

*Associated Stakeholder:* Local Cities and Counties

*Description:* Generically represents city, county and other (state and federal) fire departments that have their primary jurisdictional responsibility in the Inland Empire.

*Mapped to Entity:* Other EM

*Mapped to Entity:* Emergency Management

**Local and other Fire Vehicles**

*Status:* Existing

*Associated Stakeholder:* Local Cities and Counties

*Description:* Generically represents the respective fleets of the city, county and other fire departments.

*Mapped to Entity:* Emergency Vehicle Subsystem

**Local City and County Roadside Equipment**

*Status:* Existing

*Associated Stakeholder:* Local Cities and Counties

*Description:* Generically represents the field equipment associated with the signal systems owned and operated by Local Cities and Counties (e.g. – detection (loops, video, etc.) signal controllers, CCTV, VMS, etc.).

*Mapped to Entity:* Roadway Subsystem

*Mapped to Entity:* Other Roadway

**Local City and County Signal Systems**

*Status:* Existing

*Associated Stakeholder:* Local Cities and Counties

*Description:* Generically represents the signal systems owned and operated by Local Cities and Counties.

*Mapped to Entity:* Other TM

*Mapped to Entity:* Traffic Management





### **Local Police and Sheriff Departments Systems**

*Status:* Existing

*Associated Stakeholder:* Local Cities and Counties

*Description:* Generically represents city, county and other (state and federal) law enforcement agencies that have their primary jurisdictional responsibility in the Inland Empire.

*Mapped to Entity:* Other EM

*Mapped to Entity:* Emergency Management

### **Local Police and Sheriff Dept Vehicles**

*Status:* Existing

*Associated Stakeholder:* Local Cities and Counties

*Description:* Generically represents the respective fleets of the city, county and other law enforcement agencies.

*Mapped to Entity:* Emergency Vehicle Subsystem

### **Media**

*Status:* Existing

*Associated Stakeholder:* TV, radio and other media outlets (Internet, kiosks, etc.)

*Description:* The Media element generically represents the information systems that provide traffic reports, travel conditions, and other transportation-related news services to the traveling public through radio, TV, and other media (Internet, etc.).

*Mapped to Entity:* Media

*Mapped to Entity:* Information Service Provider

*Mapped to Entity:* Other ISP

### **Metrolink Operations Center**

*Status:* Existing

*Associated Stakeholder:* Metrolink

*Mapped to Entity:* Transit Management

*Mapped to Entity:* Other TRM

### **Metrolink Trains**

*Status:* Existing

*Associated Stakeholder:* Metrolink

*Mapped to Entity:* Transit Vehicle Subsystem

### **Municipal and small transit agencies systems**

*Status:* Existing

*Associated Stakeholder:* Local Cities and Counties

*Description:* Barstow Area Transit, Banning Transit, Beaumont Transit, Needles Area Transit, Riverside Special Services, Victor Valley Transit Authority, MARTA, Corona Cruiser, Palo Verde Valley Transit, etc..

*Mapped to Entity:* Other TRM

*Mapped to Entity:* Transit Management

### **Municipal and small transit agencies vehicles**

*Status:* Existing

*Associated Stakeholder:* Local Cities and Counties

*Description:* Vehicles owned or operated by cities identified in muni or small transit agencies transit subsystem

*Mapped to Entity:* Transit Vehicle Subsystem

### **Nevada DOT (NDOT) ATMS**

*Status:* Existing

*Associated Stakeholder:* Nevada DOT (NDOT)

*Description:* Represents communications and interactions (electronic and manual) between Caltrans and NDOT for coordination of traffic management across the California/Nevada State line.

*Mapped to Entity:* Other TM



**North Main Corona Metrolink Station Pkg Mgmt System**

*Status:* Planned

*Associated Stakeholder:* Riverside County Transportation Commission (RCTC)

*Description:* Will be used to communicate parking availability at the entrance of the parking structure. Will also display train and express bus status. Contact Stephanie Wiggins, RCTC Rail Program, 909-787-7141.

*Mapped to Entity:* Other Parking

*Mapped to Entity:* Parking Management

**Omnitrans Fixed Route**

*Status:* Existing

*Associated Stakeholder:* Omnitrans

*Mapped to Entity:* Other TRM

*Mapped to Entity:* Transit Management

**Omnitrans Paratransit**

*Status:* Existing

*Associated Stakeholder:* Omnitrans

*Mapped to Entity:* Other TRM

*Mapped to Entity:* Transit Management

**Omnitrans Transit Vehicles**

*Status:* Existing

*Associated Stakeholder:* Omnitrans

*Mapped to Entity:* Transit Vehicle Subsystem

**Performance Monitoring System (PeMS)**

*Status:* Existing

*Associated Stakeholder:* Partners for Advanced Transit and Highways (PATH)

*Description:* PeMS is a data collection and analysis system developed by the Partners for Advanced Transit and Highways (PATH) under contract to Caltrans. PeMS collects data from Caltrans TMCs and other sources and archives it and in some cases uses the data to disseminate traveler information. One major thrust of PeMS is to develop and disseminate "predictive" traveler information.

*Mapped to Entity:* Archived Data Management Subsystem

*Mapped to Entity:* Other TM

*Mapped to Entity:* Other Archives

**Rail Grade Crossing Warning Eqpt.**

*Status:* Existing

*Associated Stakeholder:* Railroad Operators

*Mapped to Entity:* Wayside Equipment

**Regional Archived Data Repository**

*Status:* Existing

*Associated Stakeholder:* Southern California Association of Governments (SCAG)

*Mapped to Entity:* Other Archives

*Mapped to Entity:* Archived Data Management Subsystem

**Ride Pro**

*Status:* Existing

*Associated Stakeholder:* Riverside County Transportation Commission (RCTC)

*Mapped to Entity:* Personal Information Access

**Riverside County Call Boxes**

*Status:* Existing

*Associated Stakeholder:* Riverside County Transportation Commission (RCTC)

*Mapped to Entity:* Emergency Telecommunications System



**Riverside County Smart Call Boxes**

*Status:* Existing

*Associated Stakeholder:* Riverside County Transportation Commission (RCTC)

*Description:* This Element represents a subset of the emergency call box system that is equipped with traffic surveillance equipment that collects vehicle count data and sends it to the Caltrans D-8 TMC. The Smart Call Boxes currently collect and report only count data. It is hoped that they can eventually report speed and vehicle classification data as well as count data.

*Mapped to Entity:* Roadway Subsystem

*Mapped to Entity:* Other Roadway

**Riverside Freeway Service Patrol**

*Status:* Existing

*Associated Stakeholder:* Riverside County Transportation Commission (RCTC)

*Description:* RCTC administers this program with the CHP providing field supervision

*Mapped to Entity:* Emergency Management

*Mapped to Entity:* Other EM

**RTA Fixed Route**

*Status:* Existing

*Associated Stakeholder:* Riverside Transit Agency (RTA)

*Mapped to Entity:* Other TRM

*Mapped to Entity:* Transit Management

**RTA Paratransit**

*Status:* Existing

*Associated Stakeholder:* Riverside Transit Agency (RTA)

*Mapped to Entity:* Transit Management

*Mapped to Entity:* Other TRM

**RTA Transit Vehicles**

*Status:* Existing

*Associated Stakeholder:* Riverside Transit Agency (RTA)

*Mapped to Entity:* Transit Vehicle Subsystem

**San Bernardino County Call Boxes**

*Status:* Existing

*Associated Stakeholder:* San Bernardino Associated Governments (SANBAG)

*Mapped to Entity:* Emergency Telecommunications System

**San Bernardino County Smart Call Boxes**

*Status:* Existing

*Associated Stakeholder:* San Bernardino Associated Governments (SANBAG)

*Description:* This Element represents a subset of the emergency call box system that is equipped with traffic surveillance equipment that collects vehicle count data and sends it to the Caltrans D-8 TMC. The Smart Call Boxes currently collect and report only count data. It is hoped that they can eventually report speed and vehicle classification data as well as count data.

*Mapped to Entity:* Roadway Subsystem

*Mapped to Entity:* Other Roadway

**San Bernardino Freeway Service Patrol**

*Status:* Planned

*Associated Stakeholder:* San Bernardino Associated Governments (SANBAG)

*Description:* SANBAG administers the program and CHP provides field supervision

*Mapped to Entity:* Other EM

*Mapped to Entity:* Emergency Management



**SunLine Fixed Route**

*Status:* Existing  
*Associated Stakeholder:* SunLine Transit Agency  
*Mapped to Entity:* Other TRM  
*Mapped to Entity:* Transit Management

**SunLine Paratransit**

*Status:* Existing  
*Associated Stakeholder:* SunLine Transit Agency  
*Mapped to Entity:* Other TRM  
*Mapped to Entity:* Transit Management

**SunLine Transit Vehicles**

*Status:* Existing  
*Associated Stakeholder:* SunLine Transit Agency  
*Mapped to Entity:* Transit Vehicle Subsystem

**Temecula TOC**

*Status:* Existing  
*Associated Stakeholder:* City of Temecula  
*Mapped to Entity:* Traffic Management  
*Mapped to Entity:* Other TM

**Temecula TOC Roadside Equipment**

*Status:* Existing  
*Associated Stakeholder:* City of Temecula  
*Description:* Roadside Equipment includes any and all equipment distributed on and along the roadway which monitors and controls traffic. This can include equipment for tolling.  
*Mapped to Entity:* Roadway Subsystem  
*Mapped to Entity:* Other Roadway

**Tow Trucks (FSP)**

*Status:* Existing  
*Associated Stakeholder:* Private Tow Companies  
*Mapped to Entity:* Emergency Vehicle Subsystem

**Traveler Advisory News Network (TANN)**

*Status:* Existing  
*Associated Stakeholder:* Southern California Economic Partnership  
*Mapped to Entity:* Information Service Provider  
*Mapped to Entity:* Other ISP

**User Personal Computing Devices**

*Status:* Existing  
*Associated Stakeholder:* General Public  
*Description:* User Personal Computing Devices refers to equipment an individual uses to access transportation and traffic information. These devices can be used to access standardized or personalized travel and trip planning information; in-vehicle and pre-trip. An Internet-connected PC and in-vehicle navigation devices are examples.  
*Mapped to Entity:* Personal Information Access

**APPENDIX C**  
INTERCONNECT DIAGRAMS  
AND  
ARCHITECTURE FLOWS DIAGRAMS  
(FROM TURBO ARCHITECTURE TOOL)



***INLAND EMPIRE REGIONAL ITS ARCHITECTURE PROJECT***  
***DRAFT FUNCTIONAL REQUIREMENTS AND INTERFACE DEFINITIONS REPORT***

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The diagrams in Appendix C follow the order of the Stakeholders Report (Appendix A), and the Stakeholders' respective Associated Elements. Please follow that order to find a specific diagram.

Because of the sheer size of the complete set of architecture diagrams (118 pages), the complete set is NOT included in this electronic file. The complete set of diagrams is being provided as a separate electronic file. This will accomplish two things: 1) it will keep the file size down to a manageable size for electronic distribution of the document, and 2) it will (hopefully) prevent stakeholders from needlessly printing the complete set of diagrams, saving paper, unless it is their desire to do so.

Also, the complete set of architecture diagrams is being distributed electronically in Word format, rather than in Adobe Acrobat format. This is being done because of a slight degradation of quality of the diagrams when converted to the Adobe Acrobat format.

In the more simple diagrams that follow, as a general rule, the stakeholder/associated element for which the diagram represents, is shown in the upper left of the diagram; with the other related stakeholders/associated elements appearing below and to the right of the primary stakeholder/associated element.

For the more complex diagrams, the stakeholder/associated element for which the diagram represents, is shown in the center of the diagram; with the other related stakeholders/associated elements surrounding the primary stakeholder/associated element.

Certain of the Diagrams are very complex and have been inserted into this Appendix on 11x17 size paper. Even with this increase in paper size some of those diagrams are not readable in this format. Wherever this is the case, those diagrams will be plotted in a large "engineering drawing" format (D, E or F size, as appropriate) and distributed to all of the directly affected Stakeholders. These plots can also be made available for viewing to other interested Stakeholders in the Inland Empire region.



***INLAND EMPIRE REGIONAL ITS ARCHITECTURE PROJECT***  
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