



State of Texas
Regional ITS Architectures and Deployment Plans

Del Rio Region

Regional ITS Architecture Report

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LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
ATIS	Advanced Travel Information System
ATMS	Advanced Traffic Management System
AVL	Automated Vehicle Location
BCBP	Bureau of Customs and Border Protection
BRINSAP	Bridge Inventory Inspection System
CASC	Customs Area Security Center
CC	Control Center
CCTV	Closed-Circuit Television
CEA	Consumer Electronics Association
CISD	Consolidated Independent School District
CPT	Common Public Transportation
CVO	Commercial Vehicle Operations
DARC	Data Radio Channel
DMS	Dynamic Message Sign
DPS	Department of Public Safety
DSRC	Dedicated Short Range Communications
EIA	Electronic Industries Association
EOC	Emergency Operations Center
ETC	Electronic Toll Collection
ETMCC	External TMC Communication
EV	Emergency Vehicle
FC	Fare Collection
FHWA	Federal Highway Administration
HAR	Highway Advisory Radio
HAZMAT	Hazardous Materials

LIST OF ACRONYMS

HRI	Highway-Rail Intersections
I/F	Interface
IEEE	Institute of Electrical and Electronics Engineers
IM	Incident Management
IMMS	Incident Management Message Sets
ISP	Information Service Provider
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation System
MCM	Maintenance and Construction Management
MCV	Maintenance and Construction Vehicle
MDT	Mobile Data Terminal
MOU	Memorandum of Understanding
MS	Message Sets
NEMA	National Electrical Manufacturers Association
NOAA	National Oceanic and Atmospheric Administration
NTCIP	National Transportation Communications for ITS Protocol
OB	Onboard
PI	Passenger Information
PSAP	Public Safety Answering Point
SAE	Society of Automotive Engineers
SDO	Standards Development Organization
SP	Spatial Representation
STIC	Subcarrier Traffic Information Channel
STRATIS	South Texas Regional Advanced Transportation Information System
TCIP	Transit Communication Interface Protocol
TEA-21	Transportation Equity Act for the 21st Century
TM	Traffic Management
TMC	Traffic Management Center

LIST OF ACRONYMS

TMDD	Traffic Management Data Directory
TOC	Traffic Operations Center
TxDOT	Texas Department of Transportation
USDOT	United States Department of Transportation

SUMMARY

In January 2001, the Federal Highway Administration (FHWA) issued a final rule to implement Section 5206(e) of the Transportation Equity Act for the 21st Century (TEA-21) requiring that Intelligent Transportation System (ITS) projects funded through the Highway Trust Fund conform to the National ITS Architecture and applicable standards.

To meet these requirements, in 2001 the Texas Department of Transportation (TxDOT) initiated the development of Regional ITS Architectures and Deployment Plans throughout the State of Texas. The Del Rio Region was the tenth in the series of Regional ITS Architectures to be prepared as part of this initiative.

The Del Rio Region is located in southwest Texas, and is bordered by Mexico to the south. The Del Rio Region also is bordered by the Odessa and San Angelo TxDOT Districts and is part of the TxDOT Laredo District.

The Architecture for the Del Rio Region followed a comprehensive process focused on stakeholder outreach and education, identifying market packages and interfaces tailored to the needs of the Del Rio Region, and developing a consensus-based architecture for the Region. This architecture provides a framework for ITS infrastructure to be deployed and integrated in the Del Rio Region over the next 20 years.

Stakeholders from throughout the Region participated in the development of the Regional ITS Architecture, including representatives from TxDOT, the Texas Department of Public Safety (DPS), City of Del Rio, Val Verde County, and the US Bureau of Customs and Border Patrol. These stakeholders provided input and review at key steps in the architecture development process, including a project kick-off meeting, architecture development and review workshops, and final review of the architecture documentation.

An inventory of existing and planned ITS infrastructure in the Region provided the basis for the architecture development. Stakeholder needs that could be addressed by ITS technologies guided the selection of market packages, data flows, and integration requirements. A diverse range of needs were identified by stakeholders in the Region. High priority needs focused on traffic management, especially near the border crossing, and flood detection. Emergency vehicle signal preemption was also identified as a priority.

Market packages were selected that corresponded to the desired services and functions identified for the Region, and were customized for Del Rio Region agencies and equipment. These market packages included high priority ‘foundation’ services and functions, such as network surveillance and traveler information, as well as market packages to address coordination needs, including incident management and regional emergency response. Stakeholders then prioritized these market packages as high, medium, and low. These priorities were used in the second phase of the project to develop the ITS Deployment Plan for the Del Rio Region.

An interconnect, or “Sausage Diagram” was developed for the Del Rio Region which provided a top-level overview of system functions and primary interconnects. More detailed interfaces were then developed which identified the connectivity between the systems and elements. Each element identified in the ITS architecture for the Del Rio Region was mapped to the other elements that it must interface with. These interfaces were further defined by architecture data flows between individual elements that specify the information to be exchanged. These data flows could include requests for information, alerts and messages, status requests, confirmations, and other information requirements.



Functional requirements for the Del Rio Region were identified through customized market packages and data flows, and the equipment packages that deliver specific capabilities. The equipment packages that were identified provide more detailed descriptions of functionality and can be deployed incrementally. Standards that could apply to the Del Rio Region also were identified as part of the architecture development process.

An Operational Concept for the Del Rio Region was developed to illustrate how systems, components, and agencies will be integrated and function as a result of the framework provided by the Regional ITS Architecture. The purpose of the Operational Concept is to demonstrate the roles and responsibilities of the various stakeholders in the Del Rio Region. Potential agreements that could be required for maintenance and operations, data sharing (among agencies and with the private sector), or joint operations are listed.

The Regional ITS Architecture for the Del Rio Region is documented in the final report. In addition, a companion web site was developed that contains all of the architecture information, stakeholders, regional inventory, customized market packages, interfaces, and standards.

1. INTRODUCTION

1.1 Project Overview

In January 2001, FHWA issued a final rule to implement Section 5206(e) of the TEA-21. This rule required that ITS projects funded through the Highway Trust Fund conform to the National ITS Architecture and applicable standards. The rule requests that the National ITS Architecture be used to develop a local implementation of the National ITS Architecture, which is referred to as a “Regional ITS Architecture.”

In order to meet these requirements, TxDOT initiated the development of regional ITS architectures and deployment plans throughout the State of Texas. In addition to meeting the federal requirements for funding, the development of regional ITS architectures provides a framework for implementing ITS on a regional level, encourages interoperability and resource sharing, identifies applicable standards, and allows for cohesive long range planning among stakeholders in the Region. Although not required by the FHWA final rule, TxDOT also sought to have an ITS deployment plan developed for each Region. An ITS deployment plan identifies and prioritizes projects that are needed to implement the ITS architecture on a short-, medium-, and long-term basis.

A key goal in the development of the regional ITS architectures was to develop a consensus-based architecture with as many stakeholders as possible involved. Each stakeholder had an equal voice in determining the direction of the architecture for the Region. Stakeholders included representatives from TxDOT, cities, counties, and transit agencies. A series of four meetings were held with the ITS stakeholders to discuss the development and gather input into the Del Rio Regional ITS Architecture and Deployment Plan. In addition, a project web site was developed which contains all of the information on the Del Rio Regional ITS Architecture and provides stakeholders with an opportunity to review and comment on the architecture directly from the web.

The result is an ITS architecture that establishes a vision and direction for the Region. ITS needs of the Del Rio Region were established early in the project. Existing and planned elements of the architecture have been identified and the key agencies required to develop the ITS services, or market packages as they are referred to in the National ITS Architecture, for the Del Rio Region have also been identified. An operational concept has been developed that focuses on the roles and responsibilities of the various agencies involved in the Del Rio Region. A separate ITS Deployment Plan was developed that identifies projects in the Del Rio Region that would be needed to make the architecture functional.

1.2 Document Overview

The Del Rio Regional ITS Architecture report is organized into five key sections:

Section 1 – Introduction

This section provides an overview of the State of Texas ITS Architectures and Deployment Plans Program, the ITS architecture for the Del Rio Region, as well as an overview of some of the key features and stakeholders in the Del Rio Region.

Section 2 – Integration Strategy

This section discusses Del Rio Region stakeholder needs and issues, regional ITS initiatives and potential regional ITS programs, and opportunities for integration to achieve regional goals and contribute to regional and national ITS interoperability.

Section 3 – Regional ITS Architecture Development Process

An overview of the key steps involved in developing the ITS architecture for the Del Rio Region is provided in this section. It includes a discussion of the methodology, stakeholder involvement, architecture workshops, and architecture development process.

Section 4 – Conceptual Design

The conceptual design contains the key sections of the Del Rio Regional ITS Architecture. The inventory of existing and planned systems is presented in Section 4, and is sorted by stakeholder as well as by entity for easy reference. The market packages that were selected for the Del Rio Region also are included in this section, as are the system functional requirements. The Del Rio Region interconnects are presented, including the “Sausage Diagram” showing the relationships of the key subsystems and elements in the Region, system interfaces, and the physical subsystem architecture flows. Standards that apply to the Del Rio Regional ITS Architecture also are listed.

Section 5 – Operational Concept

An Operational Concept has been prepared that discusses the key functions and services of the envisioned ITS for the Del Rio Region. As part of this concept, several operational scenarios are described and roles and responsibilities of stakeholders are discussed. Potential agreements that could be required to support integration and information sharing are described.

The Del Rio Regional ITS Architecture also contains two appendices:

- Appendix A – Customized Market Packages; and
- Appendix B – Interface Diagrams.

A project web site has been established that contains the architecture documentation, inventories, interconnects, market packages, interfaces, and functional requirements. The web site provides hyperlinks to more detailed information about the Del Rio Regional ITS Architecture than what could feasibly be included in the printed document. In certain sections of the document, readers are referred to the project web site for additional information and details. At the time this report was published, the Del Rio Regional ITS Architecture web site was being hosted at www.consystem.com. The site can be accessed by selecting the link to Texas, and then the link to Del Rio. TxDOT plans to permanently host the site in the future at www.dot.state.tx.us/trf/its.



1.3 The Del Rio Region

1.3.1 Geographic Overview

The Del Rio Region is bordered by the TxDOT San Angelo District to the north and northeast, the TxDOT Laredo District to the southeast, the TxDOT Bryan and TxDOT Odessa District to the west and Mexico to the south. For the Del Rio Regional ITS Architecture and Deployment Plan, the study area is comprised of Val Verde County. The geographic boundaries of the Del Rio Region are highlighted in **Figure 1**.

TxDOT partners with local governments for roadway construction, maintenance, and traffic operations support. For cities with a population less than 50,000, TxDOT is the responsible agency for on-system roadways. There are no cities in the Region with populations in excess of the 50,000 threshold.

1.3.2 Roadway Infrastructure

As illustrated in **Figure 1**, the primary facilities in the Del Rio Region transportation infrastructure include US 90, US 277, US 377, and SH 163.

US 90 travels east-west along the border with Mexico in the Del Rio Region. The effective operation of this highway is critical to the movement of goods and people through the Region. US 90 extends all the way across the state of Texas from Orange, Texas, through San Antonio and Del Rio, to El Paso. US 90 connects the southern portion of Texas to Louisiana and New Mexico. Within the Del Rio Region blockages can have serious implications on drive-time for commercial vehicles and motorists alike due to the lack of obvious alternate routes. Knowing road and travel conditions within this transportation corridor and having the ability to disseminate this information to motorists are important elements for this project.

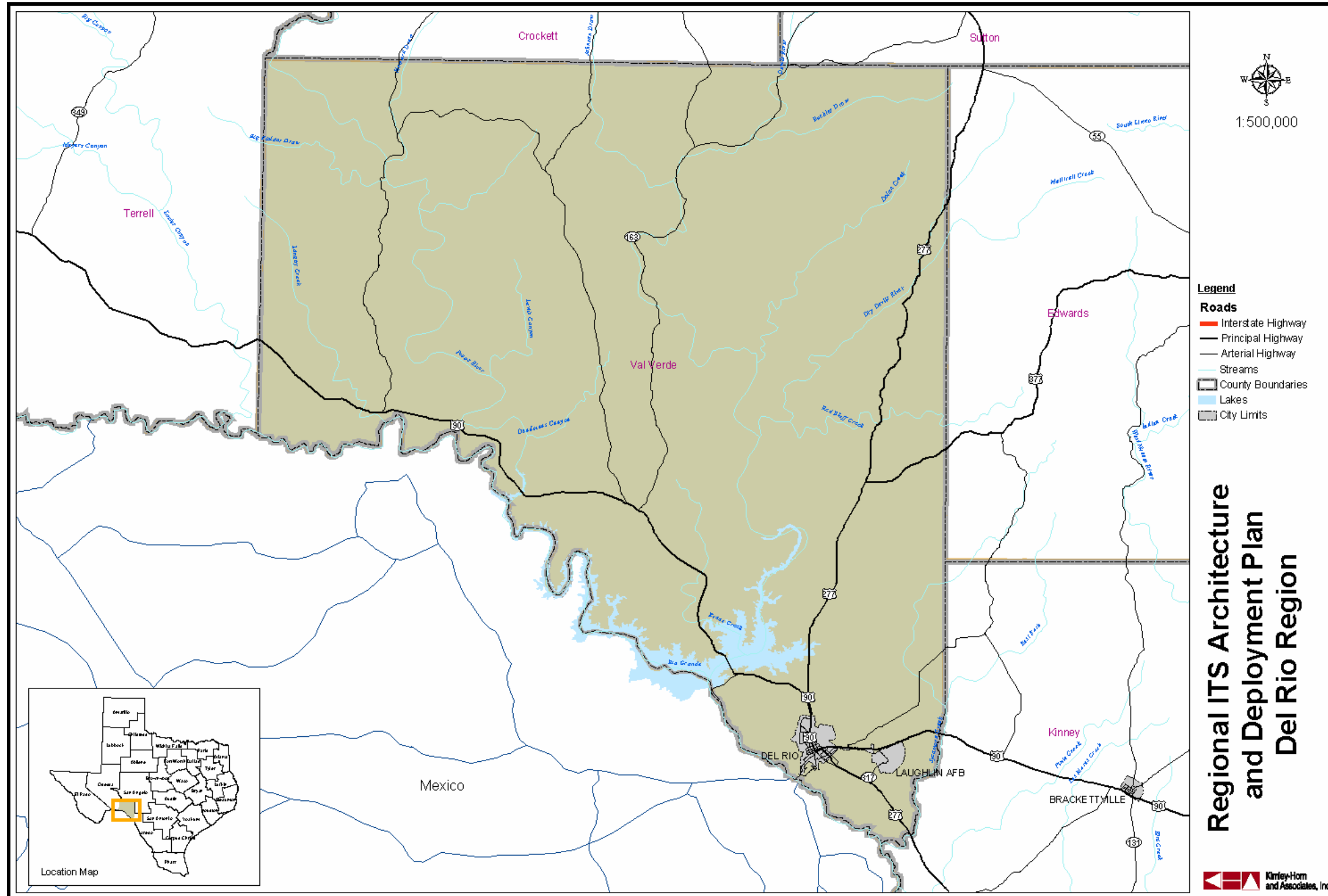


Figure 1 – Del Rio Region Map



1.3.3 Del Rio Region ITS Plans

Agencies in the Del Rio Region have previously deployed ITS components. It is important to recognize the initial deployment of ITS in a region because federal requirements mandate that a region, in order to secure future funding for ITS projects, must have an ITS architecture in place within four years of the initial deployment of ITS strategies and components. As the Del Rio Region pursues funding opportunities for proposed projects, it will be necessary to show that the proposed project fits within the architecture developed for the Region as part of this project.

Currently, the Del Rio Region has several ITS components deployed in the field including portable dynamic message signs (DMS), and electronic toll collection and license plate readers at the International Bridge. The following sections discuss these deployments.

Portable Dynamic Message Signs

TxDOT currently has one portable DMS in the Del Rio Region. It is controlled by the TxDOT Del Rio Area Office and is used to display incident and construction related messages.

Electronic Toll Collection

The City of Del Rio operates electronic toll collection (ETC) at the International Bridge. ETC systems allow residents, daily commuters, and visitors to pass through the toll lanes without stopping for payment of tolls. Participants in the program purchase a transponder and establish a pre-paid account. Transponders are small wireless devices that are installed on the windshield inside a vehicle. Each time motorists travel in the designated ETC lane, an overhead antenna reads the transponder and debits the toll amount from the pre-paid account.

License Plate Reader System

The US Customs inspection and enforcement office at the Del Rio International Bridge, maintains license plate readers that record the license plate numbers of each vehicle that crosses the border. This assists the agency with tracking what vehicles have left the country and also allows them to assist the City of Del Rio with habitual toll evaders.

1.3.4 Stakeholders

Stakeholder coordination and involvement is one of the key elements to the development of a Regional ITS Architecture and Deployment Plan. Because ITS often transcends traditional transportation infrastructure, it is important to involve non-traditional stakeholders in the architecture development and visioning process. Input from these stakeholders, both public and private, is a critical part of defining the integration needs, interfaces and overall vision for ITS in the Del Rio Region.



The following is a list of stakeholders in the Del Rio Region who have participated in the project workshops or provided input to the study team as to the needs and issues that should be considered as part of the Del Rio Regional ITS Architecture.

- City of Del Rio;
- Federal Highway Administration;
- San Felipe/Del Rio CISD;
- Texas Department of Public Safety;
- TxDOT Laredo District;
- TxDOT Traffic Operations Division (Austin);
- US Border Patrol;
- US Customs;
- Val Verde County; and
- Val Verde County Sheriff.

2. INTEGRATION STRATEGY

2.1 Integration Purpose

The purpose of the integration strategy is to identify the needs, stakeholders, and strategy for regional integration in the Del Rio Region.

For each operating agency or stakeholder entity identified through the development of the Regional ITS Architecture, there are operations that currently exist as a normal practice for each stakeholder in order to accomplish their primary business goals and objectives. As an example, a primary operation of the 911 Public Safety Answering Point (PSAP) is to dispatch emergency personnel to the appropriate locations when a call for help is placed in Val Verde County. The integration of the Val Verde County PSAP (currently operated by the Del Rio Police Department) with any of the other stakeholders will not change this primary function of the 911 dispatch or disrupt typical business practices. The integration of the 911 PSAP with another agency such as the TxDOT Del Rio Area or TxDOT Laredo District will require that the data that will be exchanged between the two entities (such as the blockage of a lane of traffic due to a crash) meet certain requirements for that particular data type. Identifying the need for this connection between agencies and the opportunities for integration and interoperability in the Region are key purposes of this section.

This section will provide an overview of the major issues and stakeholders' needs within the Del Rio Region and the primary areas of concern that were uncovered in the preparation of the Del Rio Regional ITS Architecture. Additionally, this section will discuss the need for interregional integration with agencies external to the Del Rio Region such as the need for integration with other TxDOT Districts during major incidents along US 90.

A key step in developing any regional ITS architecture is the identification of major stakeholders in the Region. Stakeholder agencies that participated in the development of the Del Rio Regional ITS Architecture are listed in **Table 1**. Minutes of meetings, copies of reports, and access to the project web site was provided to these stakeholders to facilitate their participation as much as possible.

Table 1 – Del Rio Stakeholder Agencies and Contacts

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
City of Del Rio	Harold Bean	401 E. Losoya Del Rio, Texas 78840	830-774-8150	firechief@delrio.com
City of Del Rio	Rafael Castillo, Jr.	109 W. Broadway Del Rio, Texas 78840	830-774-8558	rcastillo@wcsonline.net
City of Del Rio	Alejandro Garcia	114 W. Martin Del Rio, Texas 78841	830-774-8535	cityengineer@cityofdelrio.net
City of Del Rio	Billy Guerra	109 W. Broadway Del Rio, Texas 78840	830-774-8510	bguerra@wcsonline.net
City of Del Rio	Rudy Palafax	103 E. Gibbs Del Rio, Texas 78840	830-774-8632	N/A
City of Del Rio	Elsa Reyes	109 W. Broadway Del Rio, Texas 78840	830-774-8695	ereyes@cityofdelrio.com
Del Rio EMS	Jack Howley	801 Bedell Del Rio, Texas 78840	830-703-1700	ems@delrio.com
Del Rio Police Dept.	Antonio Becerra	110 E Broadway Del Rio, Texas 78840	830-774-8594	abecerr1@leo.gov
Del Rio Police Dept.	Manuel Herrera	110 E Broadway Del Rio, Texas 78840	830-774-8576	police@cityofdelrio.com
Federal Highway Administration	Daniel Grate, Jr.	61 Forsyth Street, SW, Suite 17T26 Atlanta, Georgia 30303	404-562-3912	daniel.grate@fhwa.dot.gov
San Felipe/Del Rio CISD	Roberto Fernandez	PO Box 420128 Del Rio, Texas 78842	830-778-4012	N/A
Texas Department of Public Safety	Frank Anguiano, III	2012 Veterans Blvd Del Rio, Texas 78840	830-775-3569	N/A
Texas Department of Public Safety	Raul Morales	2012 Veterans Blvd Del Rio, Texas 78840	830-775-3569	N/A
Texas Department of Public Safety	Elizabeth Zelifff	2012 Veterans Blvd Del Rio, Texas 78840	830-775-3569	elizabeth.zelifff@txdps.state.tx.us
TxDOT – Del Rio Area Office	Alfredo Becerra	319 East Gibbs Street Del Rio, Texas 78840	830-774-7235	abecerra@dot.state.tx.us
TxDOT – Del Rio Area Office	Juan Ramirez	319 East Gibbs Street Del Rio, Texas 78840	830-703-1428	jmramire@dot.state.tx.us
TxDOT – Laredo District	Omar Cantu	1817 Bob Bullock Loop Laredo, Texas 78043	956-712-7442	ocantu1@dot.state.tx.us
TxDOT – Laredo District	Roberto Rodriguez	1817 Bob Bullock Loop Laredo, Texas 78043	956-712-7485	rrodri9@dot.state.tx.us
TxDOT Austin Traffic Operations	Alesia Gamboa	Attn: TRF-TM 125 East 11th Street Austin, Texas 78701-2483	512-416-2780	agamboa@dot.state.tx.us

Table 1 – Del Rio Stakeholder Agencies and Contacts (continued)

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
TxDOT Austin Traffic Operations	Janie Light	Attn: TRF-TM 125 East 11th Street Austin, Texas 78701-2483	512-416-3258	jlight@dot.state.tx.us
US Border Patrol	John Poole	1868 Hwy 85 E Carrizo Springs, Texas 78834	830-876-3557	john.c.poole@dhs.gov
US Customs	Ester Cowan	International Bridge 8CR 2, Box 23 Loop Road Del Rio, Texas 78840	830-703-2012	tcowan9872@aol.com
Val Verde County	Otila Gonzalez	400 Pecan St. Del Rio, Texas 78840	830-774-7552	ogonzalez@delrio.com
Val Verde County Sheriff	JoAnn Cervantes	PO Box 1201 Del Rio, Texas 78841	830-774-7513	joanncivilcrime@yahoo.com
Val Verde County Sheriff	Pat Kraus	PO Box 1201 Del Rio, Texas 78841	830-774-7315	chiefdeputy@delriolive.com

2.2 Regional Needs

Needs from the Region were identified in the project Kick-off Meeting held in April 2003. Stakeholders participating in that meeting identified the needs in the Region according to the eight user service areas defined in the National ITS Architecture. The needs identified in the project kick-off meeting are documented in **Table 2**.

Given the location of the US 90 corridor through the Del Rio Region, and its heavy use as an east west route across southern Texas as well as the border crossing that exists nearby in the City of Del Rio, it is reasonable to expect the need for evacuations from time to time due to hazardous material spills or other threats. One of the driving forces for integrating the various stakeholders in the Del Rio Region is the need to be able to provide motorists and residents real-time information as it relates to roadway conditions during these times of large scale evacuation. For this reason, traffic data collected by the City of Del Rio and the TxDOT Laredo District will be very useful to the lead agency as it coordinates efficiently moving people away from danger and to a safe place during a time of crisis. Established standards will govern the exchange of these data.

Similarly, for non-major incidents such as traffic accidents along US 90 or one of the other smaller highways in the Region, there is a need for the TxDOT Laredo District to provide the City of Del Rio Emergency Dispatch data related to the exact location of the accident as identified using TxDOT surveillance cameras. The primary function of the surveillance cameras will be to monitor traffic conditions on a daily basis and provide the video feed to a traffic management center (TMC) where a determination can be made to post a message on a DMS given certain conditions; however, when there is an incident, the video can be extremely useful for the City of Del Rio Emergency Dispatch as it dispatches emergency personnel and manages the accident scene. The integration of these agencies will certainly not have to be physical, but rather virtual, wherein the two agencies are willing to share data, whether that information is video feeds or site clearance information, with each other. The Regional ITS Architecture for the Del Rio Region will provide a means to automate the exchange of this information.

Table 2 – Del Rio Region: Summary of ITS Needs

Del Rio Region
Summary of ITS Needs
Del Rio Regional ITS Architecture and Deployment Plan Kick-Off Meeting
April 16, 2003

Traffic Management Needs

- Need railroad preemption of traffic signals in City of Del Rio
- Need flood detection and procedure for information dissemination
- Need automatic flood gates or warning lights in remote areas prone to flooding
- Need small traffic management center (TMC) at 911 Dispatch location with link to the school district
- Need closed loop signal system for the City of Del Rio
- Need improved method for US Customs to disseminate bridge closure information
- Need special event coordination and traffic management (i.e. for parades)
- Need advanced congestion warning system for high traffic occurrences including incidents, the rodeo, Christmas travel season, and Amistad Day
- Need dynamic message signs (DMS) approaching US Border Patrol checkpoints
- Need signage approaching US Border Patrol checkpoints for congestion warnings
- Need communication infrastructure capable of supporting ITS technologies

Traveler Information Needs

- Need highway advisory radio (HAR) in the Del Rio Region

Public Transportation Management Needs

- Need improved coordination with emergency management agencies for evacuation efforts
- Need automated vehicle location (AVL) on transit vehicles

Commercial Vehicle Operations Needs

- Need undercarriage video detection at US Border Patrol checkpoints

Emergency Management Needs

- Need central dispatch for City of Del Rio fire, police and EMS
- Need emergency operations center (EOC) with connection to DPS and Border Patrol as well as City of Del Rio central dispatch
- Need automated call out system (will likely be issues with communications backbone)
- Need emergency vehicle signal preemption
- Need AVL and mobile data terminals (MDTs) on emergency vehicles
- Need video exchange center for City of Del Rio, Border Patrol, Customs and TxDOT

Archived Data Management Needs

None Identified

Maintenance and Construction Management Needs

None Identified

2.3 Regional Integration and Interoperability

The TxDOT Del Rio Region is bordered by the TxDOT San Angelo District to the north and northeast, the TxDOT Laredo District to the southeast, and the TxDOT Odessa District to the west. During times of detours along US 90, it is imperative that the agency leading the detour is cognizant of road and weather conditions in the areas to which people are being directed. In the case of Del Rio Region, the next TxDOT District along the US 90 corridor to the west is the Odessa District. As such the EOCs in Del Rio should have communications with the TxDOT Odessa District TMC.

Data collected by the TxDOT Laredo TMC should be supplied to the TxDOT Odessa District TMC so that the center will know if vehicles leaving the Odessa District should expect long delays or perhaps the Odessa District should be made aware of additional demand being places on alternate routes. This type of information could help the TxDOT Odessa District make decisions on the operations of roadways within their jurisdiction such as adjusting signal timing to accommodate the unusual traffic patterns or posting messages on DMS.

Also, during times of major crises, the Region's EOCs will need to coordinate closures on US 90 with the Texas State EOC. For example, data that should be shared includes the estimated arrival time for a major storm hitting the Region and flooding status information on roadways that are on the State's trunk highway system and have an effect outside the Del Rio Region. Additionally, incidents that occur on major roadways either in the Del Rio Region or on roadways that could impact the movement of people and goods in the Del Rio Region should be shared. The integration of the State EOC and the local EOC can facilitate the clearing of such an incident more efficiently as the State EOC can assist with identifying resources for resolving the situation.

As an example, a fuel spill along US 90 east of the Del Rio Region would require a major clean-up in addition to other emergency personnel on site. Coordination between the Local EOCs and the State EOC could identify the closest clean-up crew that could respond to the spill and dispatch them to the scene. Similarly, once on the scene, the response team could provide the State EOC and the Del Rio EOC status reports on the clean-up and potential timing for return to normal operations.

The TxDOT headquarters in Austin maintains a database of traffic counts and accident records for roadways throughout the State of Texas. On occasion, agencies within the Del Rio Region will need access to these databases either to retrieve data or supply data to the database. These data exchanges also will require integrating the agencies' data flows such that no agencies' normal business operations are disturbed to share the data.

One of the primary purposes of the development of an ITS architecture is to ensure that while various agencies are deploying ITS components, there are some commonalities between them that will allow and facilitate the exchange of data fairly seamlessly and automatically. This is not to say that all technologies or media that are used by the various agencies will be the same, but that there is an acknowledgement that the data that is being collected and disseminated is valuable to many different agencies, and that therefore, the integration strategy has to be implemented to ensure a consistent format so that data exchange is possible.

3. REGIONAL ITS ARCHITECTURE DEVELOPMENT PROCESS

Development of the Regional ITS Architecture and Deployment Plan for the Del Rio Region relied heavily on stakeholder input to ensure that the architecture reflected local needs. A series of four meetings was held with stakeholders to gather input, and a web site with the components of the regional architecture, as well as hard copies of documents, were made available to stakeholders for review and comment.

3.1 Del Rio Process

The process followed for the Del Rio Region was designed to ensure that stakeholders could provide input and review to the development of the Region’s ITS Architecture.

Prior to the first project kick-off meeting with the contractor and stakeholders, TxDOT identified relevant stakeholders in the Region to begin discussions on the development of a Regional ITS Architecture and Deployment Plan. The TxDOT Laredo District led this effort. Stakeholders signed a memorandum of understanding (MOU) stating that they would work together in the Region to develop the ITS architecture.

After selecting a contractor, the process shown in **Figure 2** was used to develop the Region’s ITS Architecture. In addition to the architecture, an ITS Deployment Plan for the Region also was developed to identify projects needed to implement the architecture.

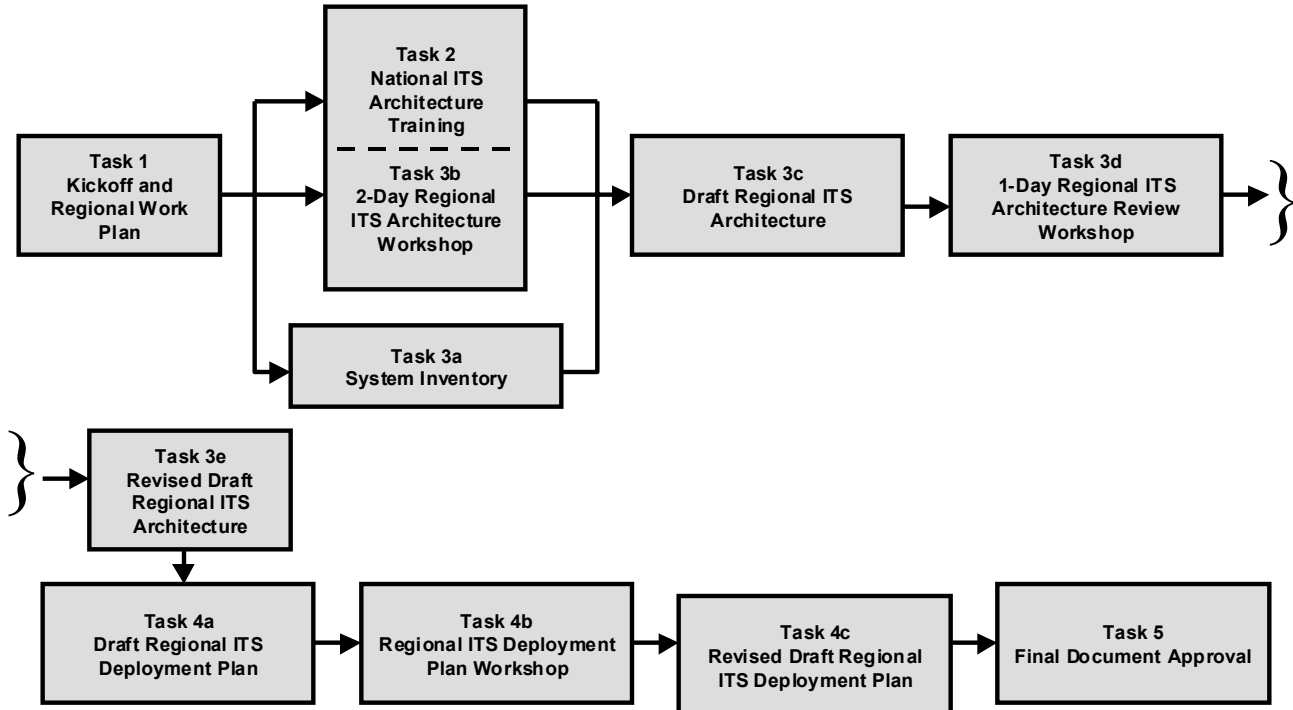


Figure 2 – Del Rio Regional ITS Architecture and Deployment Plan Development Process

A total of four meetings with stakeholders over a period of eleven months was used to develop the Del Rio Regional ITS Architecture and Deployment Plan. These meetings included:

- 1-Day Kick-off and Regional Work Plan Meeting;
- 2-Day Regional ITS Architecture Workshop;
- 1-Day Regional ITS Architecture Review Workshop; and
- ITS Deployment Plan Workshop.

Key components of the process are described below:

Task 1 – Kick-Off and Regional Work Plan: Based on the initial stakeholder meeting and MOU that was signed, a number of key stakeholders were identified. Additional stakeholders that did not sign the initial MOU also were identified and invited to the first project kick-off meeting. At this meeting, the regional work plan was presented to stakeholders for review and comment. Subsequent meeting dates were identified and agreed upon by the stakeholders.

As part of this meeting, a workshop was held with the stakeholders to identify three additional areas of information:

- Additional stakeholders to invite to participate in the process;
- Needs of the stakeholders in the Del Rio Region; and
- Existing and planned ITS elements in the Region.

Task 2 – National ITS Architecture Training: Task 2 was the development and presentation of training on the National ITS Architecture. The purpose of the training was to familiarize stakeholders with the architecture terminology to the extent needed to allow them to provide input and review on the Del Rio Region's ITS Architecture. The National ITS Architecture training was presented in conjunction with the 2-Day Regional ITS Architecture Workshop described in Task 3B.

Task 3A – System Inventory: Collecting information for the system inventory began at the kick-off meeting. During the workshop with stakeholders, information was collected to determine existing and planned ITS elements in the Region. After the kick-off meeting, follow-up calls were conducted with a number of local stakeholders to gather additional input for the architecture inventory. To finalize the inventory, stakeholders were presented with the results in the 2-Day ITS Architecture Workshop described in Task 3B.

Task 3B – 2-Day Regional ITS Architecture Workshop: The purpose of the 2-Day Regional ITS Architecture Workshop was to review the inventory with stakeholders and begin the development of the Del Rio Regional ITS Architecture. Training on the National ITS Architecture also was integrated into the workshop so that key elements of the architecture, such as market packages, could be explained prior to selecting and customizing these elements. The result of the 2-Day Regional ITS Architecture Workshop was a Regional ITS Architecture for the Del Rio Region, which included a complete system inventory, interconnect diagram, customized market packages, identification of functional requirements through process specifications, system interfaces, and relevant ITS standards.

Task 3C – Draft Regional ITS Architecture: After the 2-Day Regional ITS Architecture Workshop was completed, a web site was developed with a dedicated link to the Texas Regional ITS Architecture program. Stakeholders were asked to review the web site and provide

comments through an email link set up on the site. A hard copy of the Draft Regional ITS Architecture for the Del Rio Region was sent to stakeholders prior to the 1-Day Regional ITS Architecture Review Workshop.

Task 3D – 1-Day Regional ITS Architecture Review Workshop: The 1-Day Regional ITS Architecture Review workshop was designed to allow stakeholders to review the draft architecture and provide comments. The primary focus of the workshop was to review the architecture flows between elements in the market packages. Training on architecture flows as well as ITS standards also was completed.

Task 3E – Revised Draft Regional ITS Architecture: Input from stakeholders in the 1-Day Regional ITS Architecture Review Workshop, as well as comments from stakeholders reviewing the web site and hard copy document, were used to revise the Draft Regional ITS Architecture. The revisions were incorporated into the web site as well as into the hard copy document. The Revised Draft Regional ITS Architecture was mailed to stakeholders for additional review.

Task 4A – Draft Regional ITS Deployment Plan: A Draft Regional ITS Deployment Plan was developed based on the prioritization of market packages and needs expressed by the stakeholders in the Region. The Draft Regional ITS Deployment Plan included a list of recommended projects in a 5-year, 10-year, and 20-year timeframe. Each project was linked to at least one market package from the Del Rio Regional ITS Architecture.

Task 4B – Regional ITS Deployment Plan Workshop: The Draft Regional ITS Deployment Plan was presented to stakeholders at the Regional ITS Deployment Plan Workshop. Stakeholders were asked to provide input on the recommended projects, priority, and deployment timeframe.

Task 4C – Revised Draft Regional ITS Deployment Plan: Based on the review and input from stakeholders at the Regional ITS Deployment Plan Workshop, as well as review comments received from stakeholders outside of the workshop, a Revised Draft Regional ITS Deployment Plan was developed and sent to stakeholders.

Task 5 – Final Document Approval: Stakeholders were given several months to review the Revised Draft Regional ITS Architecture and the Revised Draft Regional ITS Deployment Plan and make comments. Comments were incorporated and a final Regional ITS Architecture and Regional ITS Deployment Plan were developed.

3.2 USDOT Regional ITS Architecture Guidance

On October 12, 2001, the U.S. Department of Transportation (USDOT) issued guidance on development of a regional ITS architecture through the document “Regional ITS Architecture Guidance: Developing, Using, and Maintaining an ITS Architecture for Your Region.” **Figure 3** summarizes the guidance provided by the USDOT.

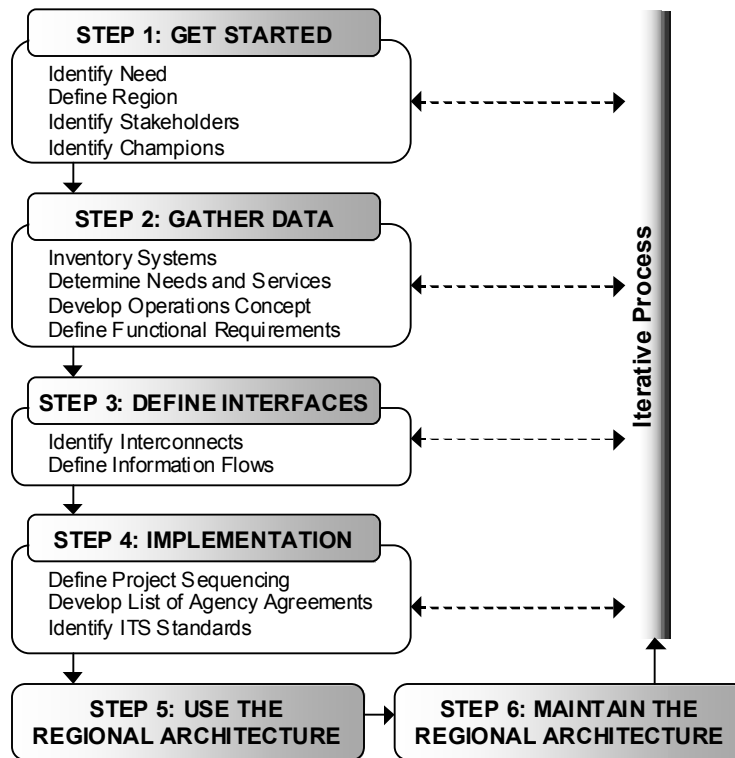
The process used to develop the Del Rio Regional ITS Architecture and Deployment Plan follows Steps 1 through 4 of the guidance. Steps 5 and 6 are designed to provide guidance upon the completion of the development of the Regional ITS Architecture.

Step 1, Get Started, of the guidance was completed in Task 1 – Kick-off and Regional Work Plan, as well as preliminary work completed by TxDOT to identify initial stakeholders and the need to complete the architecture for the Del Rio Region. Through these efforts, the need for an architecture, appropriate stakeholders, and the Region was defined.

Step 2, Gather Data, was completed through Task 1 – Kick-off and Regional Work Plan, Task 3A – System Inventory, and Task 3B – 2-Day Regional ITS Architecture Workshop. These efforts allowed the inventory for the Del Rio Region to be completed, identified ITS needs in the Region, and led to the development of an operational concept and definition of functional requirements.

Step 3, Define Interfaces, was completed in Task 3B – 2-Day Regional ITS Architecture Workshop and Task 3D – 1-Day Regional ITS Architecture Review Workshop. These workshops engaged stakeholders in customizing Market Packages for the Region, which included identifying interconnects among elements in the architecture and reviewing and selecting data flows between elements.

Step 4, Implementation, was completed in Task 3D – 1-Day Regional ITS Architecture Review Workshop through the prioritization of market packages. Sequencing of projects began in this process and was completed in the ITS Deployment Plan. Applicable ITS standards to match the identified data flows also were identified through the 1-Day ITS Architecture Review Workshop.



(Source: Regional ITS Architecture Guidance: Developing, Using, and Maintaining an ITS Architecture for Your Region, USDOT)

Figure 3 – USDOT Guidance on Regional ITS Architecture Development

4. CONCEPTUAL DESIGN

4.1 Systems Inventory

One of the key initial steps in the architecture development process is to establish an inventory of existing ITS elements. At the project kick-off meeting and through subsequent discussions with agency representatives throughout the Region, Del Rio stakeholders provided the team with a list of existing, planned, and future systems that would play a role in the Region's ITS architecture. "Planned" is defined as a system with funding identified while "future" is defined as a system that does not yet have funding identified.

Existing, planned, and future systems in the Del Rio Region were identified in the following categories:

- ***Travel and Traffic Management*** – includes state and local traffic management centers, traffic signal systems, monitoring and detection systems, dynamic message signs, railroad grade crossing technologies, and other related technologies.
- ***Public Transportation Management*** – includes transit fixed route and demand response operations, fare management, security, and travel information systems.
- ***Electronic Payment*** – includes electronic toll collection, such as for the International Bridge.
- ***Commercial Vehicle Operations*** – includes weigh-in-motion and HAZMAT management.
- ***Emergency Management*** – includes dispatch for police, fire/EMS, HAZMAT, and emergency operations/management centers.
- ***Information Management*** – includes electronic data management and archiving systems.
- ***Maintenance and Construction Management*** – includes road weather data collection systems and work zone management.

The System Inventory is a valuable task for several reasons. It provides a baseline of existing and planned ITS projects and systems in the Region, outlines which agencies are currently deploying and operating ITS, as well as those that are planning to implement ITS programs, and provides a foundation for identifying needed elements or agency participation for the regional ITS. This will be important for subsequent tasks including the market package identification and prioritization, system interface and integration requirements in the Region, and ultimately the ITS Deployment Plan.

4.1.1 Subsystems and Terminators

Each identified system or component in the Del Rio Regional ITS inventory was mapped to a subsystem or terminator in the National ITS Architecture. Subsystems and terminators are the 'entities' that represent systems in ITS. Subsystems are the highest level building blocks of the physical architecture, and the National ITS Architecture groups them into four major classes: Centers, Roadside, Vehicles, and Travelers. Each of these major classes includes various subsystems that represent a set of transportation functions (or processes) that are likely to be collected together under one agency, jurisdiction, or location, and correspond to physical elements, such as traffic operations centers, traffic signals, vehicles, and more. **Figure 4** shows the National ITS Architecture subsystems. This figure, also known as the "sausage diagram" is a standard interconnect diagram, showing the relationships of the various subsystems within the architecture; a customized interconnect diagram for the

Del Rio Region is included in Section 4.3.1 of this report. Communication functions between the subsystems are represented in the ovals. It should be noted that “wireline” communication refers to fixed-point to fixed-point communications, which include not only twisted pair and fiber optic technologies, but also such wireless technologies such as microwave and spread spectrum.

Terminators are the people, systems, other facilities, and environmental conditions outside of ITS that need to communicate or interface with ITS subsystems. They help to define the boundaries of the National ITS Architecture as well as a regional system. Examples of terminators include drivers, traffic operations personnel, information service providers, weather effects (snow, rain, fog), telecommunications systems, and government reporting systems, among others.

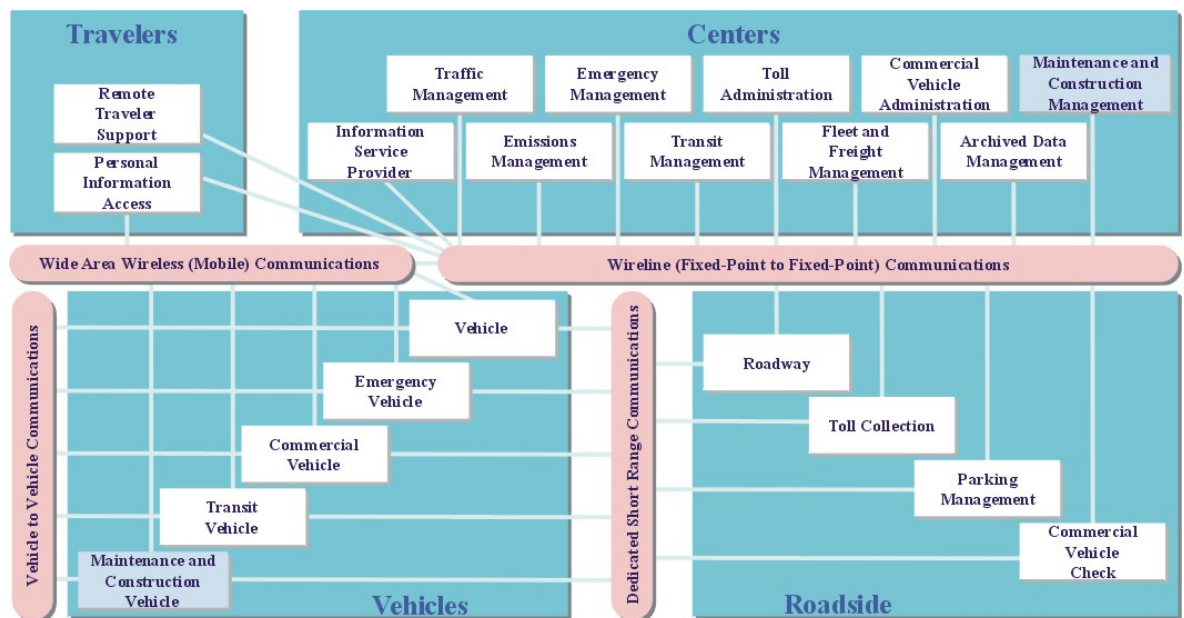


Figure 4 – Physical Subsystem Interconnect Diagram

4.1.2 Del Rio ITS Inventory by Stakeholder

Each stakeholder is associated with one or more systems or elements (subsystems and terminators) that make up the transportation system in the Del Rio Region. **Table 3** sorts the inventory by stakeholder, so each stakeholder can easily identify and review all their relevant assets that are identified in the Del Rio Regional ITS Architecture.

The information in **Table 3** also is included on the Del Rio ITS Architecture web site, which is accessible by selecting the link to the Texas Regional ITS Architecture, the Del Rio Region, and then selecting the “Inventory by Stakeholder” button which will open the stakeholder list. Each element in the list contains a hyperlink to more detailed information, including status, description, stakeholder, and other elements within the inventory with which it interfaces. (At the time this report was published, the Del Rio Regional ITS Architecture web site was being hosted at www.consystec.com. TxDOT plans to permanently host the site in the future at www.dot.state.tx.us/trf/its.)



4.1.3 *Del Rio ITS Inventory by Entity*

The Del Rio Regional ITS Architecture inventory is made up of the transportation and communications centers, the field equipment, the vehicles, and other systems in the regional transportation system. These components have been assigned to a subsystem or terminator as defined by the National ITS Architecture. **Table 4** presents the Del Rio Region inventory using the associated National ITS Architecture subsystem or terminator. This sorts elements that perform similar functions together, so elements of a particular type can be easily identified.

This inventory also can be accessed from the Del Rio Regional ITS Architecture web site by selecting the “Inventory by Entity” button.

Table 3 – Del Rio Inventory of Regional Subsystems/Terminators (sorted by Stakeholder)

Stakeholder	Element	Entity	Status
AMTRAK	AMTRAK Passenger Terminal	Multimodal Transportation Service Provider	Existing
Archive Data Users	Crash Data Users	Archived Data User Systems	Future
	Del Rio Regional Planning Data System Users	Archived Data User Systems	Future
City of Del Rio	City of Del Rio Asset Inventory	Archived Data Management Subsystem	Existing
	City of Del Rio International Bridge Toll Plaza Office	Toll Administration Subsystem	Future
	City of Del Rio Public Access	Information Service Provider Subsystem	Existing
	City of Del Rio Toll Tags	Vehicle Subsystem	Future
	City of Del Rio Web Site	Information Service Provider Subsystem	Existing
	Del Rio Regional Airport	Multimodal Transportation Service Provider	Existing
City of Del Rio Emergency Management	City of Del Rio Centralized Dispatch Center	Emergency Management Subsystem	Existing
	City of Del Rio EOC	Emergency Management Subsystem	Future
	Early Warning Broadcast System	Information Service Provider Subsystem	Existing
City of Del Rio Engineering Department	City of Del Rio Field Equipment	Roadway Subsystem	Existing
	City of Del Rio International Bridge Field Equipment	Roadway Subsystem	Future
City of Del Rio Fire Department	City of Del Rio Fire Department	Emergency Management Subsystem	Existing
	City of Del Rio Fire Vehicles	Emergency Vehicle Subsystem	Existing
City of Del Rio Gas Department	City of Del Rio Gas Dispatch Center	Maintenance and Construction Management Subsystem	Existing
City of Del Rio Police Department	City of Del Rio Police Dispatch	Emergency Management Subsystem	Existing
	City of Del Rio Police Vehicles	Emergency Vehicle Subsystem	Existing
City of Del Rio Streets Department	City of Del Rio Fleet Maintenance	Equipment Repair Facility	Existing
	City of Del Rio International Bridge Toll Plazas	Toll Collection Subsystem	Existing
	City of Del Rio Maintenance Dispatch	Maintenance and Construction Management Subsystem	Existing
	City of Del Rio Storage Yard	Storage Facility	Existing

Table 3 – Del Rio Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
City of Del Rio Streets Department (continued)	City of Del Rio Streets Department Vehicles	Maintenance and Construction Vehicle Subsystem	Existing
	City of Del Rio Traffic Maintenance	Maintenance and Construction Management Subsystem	Existing
	City of Del Rio Traffic Operations Center	Traffic Management Subsystem	Future
	City of Del Rio Water Level Sensors and Signs	Roadway Subsystem	Future
City of Del Rio Transportation Department	City of Del Rio Fixed Route Transit Vehicles	Transit Vehicle Subsystem	Planned
	City of Del Rio Paratransit Dispatch	Transit Management Subsystem	Existing
	City of Del Rio Paratransit Vehicles	Transit Vehicle Subsystem	Existing
	City of Del Rio Transit Dispatch	Transit Management Subsystem	Future
City of Del Rio Water/Wastewater Department	City of Del Rio Water/Wastewater Dispatch Center	Maintenance and Construction Management Subsystem	Existing
Commercial Vehicle Operators	Commercial Vehicle Operator Systems	Fleet and Freight Management Subsystem	Existing
	Commercial Vehicles	Commercial Vehicle Subsystem	Existing
	Commercial Vehicles	Vehicle Subsystem	Existing
Del Rio Chamber of Commerce	Del Rio Chamber of Commerce	Event Promoters	Existing
DPS	DPS Administration	Emergency Management Subsystem	Existing
	DPS Communications Service	Emergency Management Subsystem	Existing
	DPS Electronic Screening Stations	Commercial Vehicle Check Subsystem	Existing
	DPS License and Weights Division	Enforcement Agency	Existing
	DPS Vehicles	Emergency Vehicle Subsystem	Existing
	Statewide Crash Records Information System	Archived Data Management Subsystem	Existing
	Statewide Crash Records Information System	Information Service Provider Subsystem	Existing
DPS Division of Emergency Management	State EOC	Emergency Management Subsystem	Existing
Financial Institution	Financial Institution	Financial Institution	Future

Table 3 – Del Rio Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
Independent School Districts	Independent School District Buses	Transit Vehicle Subsystem	Existing
	Independent School District Dispatch	Transit Management Subsystem	Existing
	Independent School District Police Dispatch	Emergency Management Subsystem	Existing
	Independent School District Police Vehicles	Emergency Vehicle Subsystem	Existing
International Boundary Water Commission	IBWC Operations Center	Emergency Management Subsystem	Existing
Local Media	Local Print and Broadcast Media	Media	Existing
Municipal or County Public Safety	Municipal Public Safety Dispatch	Emergency Management Subsystem	Existing
National Park Service	NPS Amistad National Recreation Area	Emergency Management Subsystem	Existing
NOAA	National Weather Service	Weather Service	Existing
Other States	Other States Credentials Administration and Safety Systems	Other CVAS	Future
Private Information Service Providers	Private Sector Traveler Information Services	Information Service Provider Subsystem	Future
Private Rural Transit Systems	Private Sector Transit System Dispatch	Transit Management Subsystem	Existing
Private Taxi Providers	Private Taxi Provider Dispatch	Transit Management Subsystem	Existing
Private Tow/Wrecker Providers	Private Tow/Wrecker Dispatch	Emergency Management Subsystem	Existing
Private Travelers	Private Travelers Personal Computing Devices	Personal Information Access Subsystem	Future
	Private Vehicles	Vehicle Subsystem	Existing
Private Utility Companies	Private Utility Company Dispatch	Maintenance and Construction Management Subsystem	Existing
Rail Operators	Rail Operations Centers	Rail Operations	Existing
	Rail Operators Wayside Equipment	Wayside Equipment	Existing
Regional Emergency and Public Safety Agencies	Del Rio Regional Incident and Mutual Aid Network	Other EM	Future
Regional Event Facilities	Regional Event Facilities	Event Promoters	Existing
State Fire Marshal	State Fire Marshal	Archived Data Management Subsystem	Existing

Table 3 – Del Rio Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
TxDOT	Other TxDOT District Maintenance Sections	Maintenance and Construction Management Subsystem	Existing
	TxDOT 511 System	Information Service Provider Subsystem	Planned
	TxDOT BRINSAP	Asset Management	Existing
	TxDOT Credentials Administration and Safety Information Exchange	Commercial Vehicle Administration Subsystem	Future
	TxDOT Del Rio Field Equipment	Roadway Subsystem	Existing
	TxDOT Del Rio Traffic Operations Center	Traffic Management Subsystem	Existing
	TxDOT Fort Worth TMC (TransVision)	Traffic Management Subsystem	Existing
	TxDOT Highway Conditions Reporting System	Information Service Provider Subsystem	Existing
	TxDOT Highway Conditions Reporting System	Maintenance and Construction Management Subsystem	Existing
	TxDOT Laredo Archived Data Management System	Archived Data Management Subsystem	Future
	TxDOT Laredo District Public Information Office	Information Service Provider Subsystem	Future
	TxDOT Laredo District Shop	Equipment Repair Facility	Existing
	TxDOT Laredo District Web Page	Information Service Provider Subsystem	Existing
	TxDOT Laredo TMC - STRATIS	Traffic Management Subsystem	Existing
	TxDOT Maintenance Section Storage Facility	Storage Facility	Existing
	TxDOT Maintenance Sections	Maintenance and Construction Management Subsystem	Existing
	TxDOT Maintenance Vehicles	Maintenance and Construction Vehicle Subsystem	Existing
	TxDOT Motor Carrier Routing Information	Information Service Provider Subsystem	Existing
TxDOT Water Level Sensors and Signs	Roadway Subsystem	Future	
US Air Force	Laughlin AFB Operations Center	Emergency Management Subsystem	Existing

Table 3 – Del Rio Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
US Bureau of Customs and Border Protection	US BCBP Amistad Dam Port of Entry	Emergency Management Subsystem	Existing
	US BCBP Border Patrol Communications Center	Emergency Management Subsystem	Existing
	US BCBP Border Patrol Stations	Emergency Management Subsystem	Existing
	US BCBP Border Patrol Stations	Roadway Subsystem	Existing
	US BCBP Border Patrol Vehicles	Emergency Vehicle Subsystem	Existing
	US BCBP CASC	Emergency Management Subsystem	Existing
	US BCBP Customs Field Equipment	Roadway Subsystem	Existing
	US BCBP Customs Product Manifest System	Commercial Vehicle Administration Subsystem	Future
	US BCBP Electronic Clearance System	Commercial Vehicle Check Subsystem	Future
	US BCBP Web Site	Information Service Provider Subsystem	Existing
	US Border Patrol Checkpoints	Roadway Subsystem	Existing
	US Border Patrol Checkpoints	Traffic Management Subsystem	Existing
Val Verde County	Val Verde County Rural Volunteer Fire	Emergency Management Subsystem	Existing
	Val Verde County Rural Volunteer Fire Vehicles	Emergency Vehicle Subsystem	Existing
Val Verde County Judge	Val Verde County EOC	Emergency Management Subsystem	Existing
Val Verde County Road and Bridge	Val Verde County Road and Bridge Precincts	Maintenance and Construction Management Subsystem	Existing
	Val Verde County Road and Bridge Vehicles	Maintenance and Construction Vehicle Subsystem	Existing
Val Verde County Sheriff	Val Verde County Sheriff Communications Center	Emergency Management Subsystem	Existing
	Val Verde County Sheriff Vehicles	Emergency Vehicle Subsystem	Existing
Val Verde Regional Hospital	Val Verde County Regional Medical Center	Care Facility	Existing
	Val Verde EMS Dispatch	Emergency Management Subsystem	Existing
	Val Verde EMS Vehicles	Emergency Vehicle Subsystem	Existing
Wachanhut Correctional Center	Val Verde County Jail	Emergency Management Subsystem	Existing

Table 4 – Del Rio Inventory of Regional Subsystems/Terminators (sorted by Entity)

Entity	Element	Stakeholder	Status
Archived Data Management Subsystem	City of Del Rio Asset Inventory	City of Del Rio	Existing
	State Fire Marshal	State Fire Marshal	Existing
	Statewide Crash Records Information System	DPS	Existing
	TxDOT Laredo Archived Data Management System	TxDOT	Future
Archived Data User Systems	Crash Data Users	Archive Data Users	Future
	Del Rio Regional Planning Data System Users	Archive Data Users	Future
Asset Management	TxDOT BRINSAP	TxDOT	Existing
Care Facility	Val Verde County Regional Medical Center	Val Verde Regional Hospital	Existing
Commercial Vehicle Administration Subsystem	TxDOT Credentials Administration and Safety Information Exchange	TxDOT	Future
	US BCBP Customs Product Manifest System	US Bureau of Customs and Border Protection	Future
Commercial Vehicle Check Subsystem	DPS Electronic Screening Stations	DPS	Existing
	US BCBP Electronic Clearance System	US Bureau of Customs and Border Protection	Future
Commercial Vehicle Subsystem	Commercial Vehicles	Commercial Vehicle Operators	Existing
Emergency Management Subsystem	City of Del Rio Centralized Dispatch Center	City of Del Rio Emergency Management	Existing
	City of Del Rio EOC	City of Del Rio Emergency Management	Future
	City of Del Rio Fire Department	City of Del Rio Fire Department	Existing
	City of Del Rio Police Dispatch	City of Del Rio Police Department	Existing
	DPS Administration	DPS	Existing
	DPS Communications Service	DPS	Existing
	IBWC Operations Center	International Boundary Water Commission	Existing
	Independent School District Police Dispatch	Independent School Districts	Existing
	Laughlin AFB Operations Center	US Air Force	Existing
	Municipal Public Safety Dispatch	Municipal or County Public Safety	Existing
	NPS Amistad National Recreation Area	National Park Service	Existing

Table 4 – Del Rio Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Emergency Management Subsystem (continued)	Private Tow/Wrecker Dispatch	Private Tow/Wrecker Providers	Existing
	State EOC	DPS Division of Emergency Management	Existing
	US BCBP Amistad Dam Port of Entry	US Bureau of Customs and Border Protection	Existing
	US BCBP Border Patrol Communications Center	US Bureau of Customs and Border Protection	Existing
	US BCBP Border Patrol Stations	US Bureau of Customs and Border Protection	Existing
	US BCBP CASC	US Bureau of Customs and Border Protection	Existing
	Val Verde County EOC	Val Verde County Judge	Existing
	Val Verde County Jail	Wachanhut Correctional Center	Existing
	Val Verde County Rural Volunteer Fire	Val Verde County	Existing
	Val Verde County Sheriff Communications Center	Val Verde County Sheriff	Existing
	Val Verde EMS Dispatch	Val Verde Regional Hospital	Existing
Emergency Vehicle Subsystem	City of Del Rio Fire Vehicles	City of Del Rio Fire Department	Existing
	City of Del Rio Police Vehicles	City of Del Rio Police Department	Existing
	DPS Vehicles	DPS	Existing
	Independent School District Police Vehicles	Independent School Districts	Existing
	US BCBP Border Patrol Vehicles	US Bureau of Customs and Border Protection	Existing
	Val Verde County Rural Volunteer Fire Vehicles	Val Verde County	Existing
	Val Verde County Sheriff Vehicles	Val Verde County Sheriff	Existing
	Val Verde EMS Vehicles	Val Verde Regional Hospital	Existing
Enforcement Agency	DPS License and Weights Division	DPS	Existing
Equipment Repair Facility	City of Del Rio Fleet Maintenance	City of Del Rio Streets Department	Existing
	TxDOT Laredo District Shop	TxDOT	Existing
Event Promoters	Del Rio Chamber of Commerce	Del Rio Chamber of Commerce	Existing
	Regional Event Facilities	Regional Event Facilities	Existing

Table 4 – Del Rio Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Financial Institution	Financial Institution	Financial Institution	Future
Fleet and Freight Management Subsystem	Commercial Vehicle Operator Systems	Commercial Vehicle Operators	Existing
Information Service Provider Subsystem	City of Del Rio Public Access	City of Del Rio	Existing
	City of Del Rio Web Site	City of Del Rio	Existing
	Early Warning Broadcast System	City of Del Rio Emergency Management	Existing
	Private Sector Traveler Information Services	Private Information Service Providers	Future
	Statewide Crash Records Information System	DPS	Existing
	TxDOT 511 System	TxDOT	Planned
	TxDOT Highway Conditions Reporting System	TxDOT	Existing
	TxDOT Laredo District Public Information Office	TxDOT	Future
	TxDOT Laredo District Web Page	TxDOT	Existing
	TxDOT Motor Carrier Routing Information	TxDOT	Existing
US BCBP Web Site	US Bureau of Customs and Border Protection	Existing	
Maintenance and Construction Management Subsystem	City of Del Rio Gas Dispatch Center	City of Del Rio Gas Department	Existing
	City of Del Rio Maintenance Dispatch	City of Del Rio Streets Department	Existing
	City of Del Rio Traffic Maintenance	City of Del Rio Streets Department	Existing
	City of Del Rio Water/Wastewater Dispatch Center	City of Del Rio Water/Wastewater Department	Existing
	Other TxDOT District Maintenance Sections	TxDOT	Existing
	Private Utility Company Dispatch	Private Utility Companies	Existing
	TxDOT Highway Conditions Reporting System	TxDOT	Existing
	TxDOT Maintenance Sections	TxDOT	Existing
	Val Verde County Road and Bridge Precincts	Val Verde County Road and Bridge	Existing

Table 4 – Del Rio Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Maintenance and Construction Vehicle Subsystem	City of Del Rio Streets Department Vehicles	City of Del Rio Streets Department	Existing
	TxDOT Maintenance Vehicles	TxDOT	Existing
	Val Verde County Road and Bridge Vehicles	Val Verde County Road and Bridge	Existing
Media	Local Print and Broadcast Media	Local Media	Existing
Multimodal Transportation Service Provider	AMTRAK Passenger Terminal	AMTRAK	Existing
	Del Rio Regional Airport	City of Del Rio	Existing
Other CVAS	Other States Credentials Administration and Safety Systems	Other States	Future
Other EM	Del Rio Regional Incident and Mutual Aid Network	Regional Emergency and Public Safety Agencies	Future
Personal Information Access Subsystem	Private Travelers Personal Computing Devices	Private Travelers	Future
Rail Operations	Rail Operations Centers	Rail Operators	Existing
Roadway Subsystem	City of Del Rio Field Equipment	City of Del Rio Engineering Department	Existing
	City of Del Rio International Bridge Field Equipment	City of Del Rio Engineering Department	Future
	City of Del Rio Water Level Sensors and Signs	City of Del Rio Streets Department	Future
	TxDOT Del Rio Field Equipment	TxDOT	Existing
	TxDOT Water Level Sensors and Signs	TxDOT	Future
	US BCBP Border Patrol Stations	US Bureau of Customs and Border Protection	Existing
	US BCBP Customs Field Equipment	US Bureau of Customs and Border Protection	Existing
	US Border Patrol Checkpoints	US Bureau of Customs and Border Protection	Existing
Storage Facility	City of Del Rio Storage Yard	City of Del Rio Streets Department	Existing
	TxDOT Maintenance Section Storage Facility	TxDOT	Existing
Toll Administration Subsystem	City of Del Rio International Bridge Toll Plaza Office	City of Del Rio	Future
Toll Collection Subsystem	City of Del Rio International Bridge Toll Plazas	City of Del Rio Streets Department	Existing

Table 4 – Del Rio Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Traffic Management Subsystem	City of Del Rio Traffic Operations Center	City of Del Rio Streets Department	Future
	TxDOT Del Rio Traffic Operations Center	TxDOT	Existing
	TxDOT Fort Worth TMC (TransVision)	TxDOT	Existing
	TxDOT Laredo TMC - STRATIS	TxDOT	Existing
	US Border Patrol Checkpoints	US Bureau of Customs and Border Protection	Existing
Transit Management Subsystem	City of Del Rio Paratransit Dispatch	City of Del Rio Transportation Department	Existing
	City of Del Rio Transit Dispatch	City of Del Rio Transportation Department	Future
	Independent School District Dispatch	Independent School Districts	Existing
	Private Sector Transit System Dispatch	Private Rural Transit Systems	Existing
	Private Taxi Provider Dispatch	Private Taxi Providers	Existing
Transit Vehicle Subsystem	City of Del Rio Fixed Route Transit Vehicles	City of Del Rio Transportation Department	Planned
	City of Del Rio Paratransit Vehicles	City of Del Rio Transportation Department	Existing
	Independent School District Buses	Independent School Districts	Existing
Vehicle Subsystem	City of Del Rio Toll Tags	City of Del Rio	Future
	Commercial Vehicles	Commercial Vehicle Operators	Existing
	Private Vehicles	Private Travelers	Existing
Wayside Equipment	Rail Operators Wayside Equipment	Rail Operators	Existing
Weather Service	National Weather Service	NOAA	Existing

4.2 Regional Market Packages

Upon completion of the system inventory, the next step in the development of the architecture was to identify the transportation services that are important to the Del Rio Region. In the National ITS Architecture, services are referred to as market packages. Market packages could include several stakeholders and elements that work together to provide a service in the Region. Examples of market packages from the National ITS Architecture include Network Surveillance, Traffic Information Dissemination, and Transit Vehicle Tracking. There are currently a total of 75 market packages identified in the National ITS Architecture.

In the Del Rio Region, the National ITS Architecture market packages were reviewed by the stakeholders and selected based on the relevance of the service that the market package could provide to the Region. All of the market packages that stakeholders in the Del Rio Region selected for implementation in the Region are identified in **Table 5**, as well as the elements in the Region that serve a role in providing the market package service and the primary stakeholders responsible for implementing the market packages.

In several cases, there are multiple stakeholders in the Region that provide the same service at different levels. For example, Surface Street Control (ATMS03) could be provided on arterials by the City of Del Rio and on highways through the TxDOT Laredo District. The market packages status is identified as existing, planned, or future for each of the primary stakeholders in the Region. In many cases market packages classified as existing might still need to be enhanced to increase the service that the market package provides and establish all of the elements associated with it.

Upon selecting the market packages that were applicable for the Region, stakeholders then reviewed each market package and the elements that could be included to customize it for the Region. This customization is discussed further in the following section.

Table 5 – Del Rio Region Selected Market Packages

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
ATMS01	Network Surveillance	City of Del Rio Field Equipment City of Del Rio International Bridge Field Equipment City of Del Rio Traffic Operations Center City of Del Rio Web Site TxDOT 511 System TxDOT Del Rio Field Equipment TxDOT Del Rio Traffic Operations Center TxDOT Laredo District Web Page	City of Del Rio	Future
			TxDOT Del Rio	Future
ATMS02	Probe Surveillance	City of Del Rio International Bridge Field Equipment City of Del Rio Traffic Operations Center Commercial Vehicles Private Vehicles	City of Del Rio	Future

Table 5 – Del Rio Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
ATMS03	Surface Street Control	City of Del Rio Field Equipment	City of Del Rio	Future
		City of Del Rio Traffic Operations Center	TxDOT Del Rio	Future
		TxDOT Del Rio Field Equipment TxDOT Del Rio Traffic Operations Center		
ATMS06	Traffic Information Dissemination	City of Del Rio Centralized Dispatch Center	City of Del Rio	Future
		City of Del Rio Field Equipment	TxDOT Del Rio	Future
		City of Del Rio Fire Department		
		City of Del Rio Maintenance Dispatch		
		City of Del Rio Paratransit Dispatch		
		City of Del Rio Police Dispatch		
		City of Del Rio Traffic Operations Center		
		City of Del Rio Transit Dispatch		
		DPS Communications Service		
		Independent School District Dispatch		
		Independent School District Police Dispatch		
		Local Print and Broadcast Media		
		Private Sector Transit System Dispatch		
		TxDOT Del Rio Field Equipment TxDOT Del Rio Traffic Operations Center TxDOT Maintenance Sections		
Val Verde County Road and Bridge Precincts Val Verde County Sheriff Communications Center				
ATMS07	Regional Traffic Control	City of Del Rio Traffic Operations Center	TxDOT Del Rio	Future
		TxDOT Del Rio Traffic Operations Center		
		TxDOT Fort Worth TMC (TransVision)		
		TxDOT Laredo TMC – STRATIS		
ATMS08	Incident Management System	City of Del Rio Centralized Dispatch Center	City of Del Rio	Future
		City of Del Rio EOC	TxDOT Del Rio	Future
		City of Del Rio Fire Department	Val Verde County	Future
		City of Del Rio Fire Vehicles	Utility Companies	Future
		City of Del Rio Gas Dispatch Center	Emergency Management Agencies	Future
		City of Del Rio Maintenance Dispatch		
		City of Del Rio Paratransit Dispatch City of Del Rio Police Dispatch City of Del Rio Police Vehicles City of Del Rio Traffic Maintenance City of Del Rio Traffic Operations Center		

Table 5 – Del Rio Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
ATMS08 (continued)	Incident Management System (continued)	City of Del Rio Transit Dispatch City of Del Rio Water Level Sensors and Signs City of Del Rio Water/Wastewater Dispatch Center Del Rio Chamber of Commerce DPS Vehicles DPS Communications Service IBWC Operations Center Independent School District Dispatch Independent School District Police Dispatch Independent School District Police Vehicles Laughlin AFB Operations Center Municipal Public Safety Dispatch National Weather Service Other TxDOT District Maintenance Sections Private Sector Transit System Dispatch Private Utility Company Dispatch Rail Operations Centers Regional Event Facilities TxDOT Del Rio Traffic Operations Center TxDOT Maintenance Sections TxDOT Water Level Sensors and Signs US BCBP Border Patrol Communications Center US BCBP Border Patrol Stations US BCBP Border Patrol Vehicles US BCBP CASC US BCBP Customs Field Equipment US Border Patrol Checkpoints Val Verde County Rural Volunteer Fire Val Verde County Rural Volunteer Fire Vehicles Val Verde County Road and Bridge Precincts Val Verde County Sheriff Communications Center Val Verde County Sheriff Vehicles Val Verde EMS Dispatch Val Verde EMS Vehicles		

Table 5 – Del Rio Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
ATMS10	Electronic Toll Collection	City of Del Rio International Bridge Field Equipment City of Del Rio International Bridge Toll Plaza Office City of Del Rio International Bridge Toll Plazas City of Del Rio Police Dispatch City of Del Rio Toll Tags City of Del Rio Web Site Commercial Vehicle Operator Systems Financial Institution	City of Del Rio	Future
ATMS13	Standard Railroad Grade Crossing	City of Del Rio Field Equipment City of Del Rio Traffic Operations Center Rail Operators Wayside Equipment TxDOT Del Rio Field Equipment TxDOT Del Rio Traffic Operations Center	City of Del Rio	Future
			TxDOT Del Rio	Future
ATMS14	Advanced Railroad Grade Crossing	City of Del Rio Field Equipment City of Del Rio Traffic Operations Center Rail Operations Centers Rail Operators Wayside Equipment	City of Del Rio	Future
ATMS15	Railroad Operations Coordination	City of Del Rio Traffic Operations Center Rail Operations Centers TxDOT Del Rio Traffic Operations Center	City of Del Rio	Future
			TxDOT Del Rio	Future
EM1	Emergency Response	City of Del Rio Centralized Dispatch Center City of Del Rio EOC City of Del Rio Fire Department City of Del Rio Paratransit Dispatch City of Del Rio Police Dispatch City of Del Rio Transit Dispatch Del Rio Regional Incident and Mutual Aid Network DPS Communications Service Early Warning Broadcast System IBWC Operations Center Independent School District Dispatch Independent School District Police Dispatch Laughlin AFB Operations Center Municipal Public Safety Dispatch	Emergency Management Agencies	Future
			City of Del Rio	Future
			Transit Agencies	Future

Table 5 – Del Rio Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
EM1 (continued)	Emergency Response (continued)	NPS Amistad National Recreation Area Private Tow/Wrecker Dispatch State EOC State Fire Marshall US BCBP Amistad Dam Port of Entry US BCBP Border Patrol Communications Center US BCBP Border Patrol Stations Val Verde County Jail Val Verde County Rural Volunteer Fire Val Verde County Sheriff Communications Center Val Verde EMS Dispatch		
EM2	Emergency Routing	City of Del Rio Centralized Dispatch Center City of Del Rio Field Equipment City of Del Rio Fire Vehicles City of Del Rio Traffic Operations Center TxDOT Del Rio Field Equipment TxDOT Del Rio Traffic Operations Center Val Verde EMS Dispatch Val Verde EMS Vehicles Val Verde County Regional Medical Center	City of Del Rio	Future
			Val Verde County	Future
MC01	Maintenance and Construction Vehicle Tracking	City of Del Rio Maintenance Dispatch City of Del Rio Streets Department Vehicles TxDOT Maintenance Sections TxDOT Maintenance Vehicles Val Verde County Road and Bridge Precincts Val Verde County Road and Bridge Vehicles	City of Del Rio	Future
			TxDOT Del Rio	Future
			Val Verde County	Future
MC02	Maintenance and Construction Vehicle Maintenance	City of Del Rio Fleet Maintenance City of Del Rio Maintenance Dispatch City of Del Rio Streets Department Vehicles TxDOT Laredo District Shop TxDOT Maintenance Sections TxDOT Maintenance Vehicles	City of Del Rio	Future
			TxDOT Del Rio	Future
MC03	Road Weather Data Collection	National Weather Service TxDOT Del Rio Field Equipment TxDOT Del Rio Traffic Operations Center	TxDOT Del Rio	Future

Table 5 – Del Rio Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
MC04	Weather Information Processing and Distribution	City of Del Rio Fire Department City of Del Rio Maintenance Dispatch City of Del Rio Paratransit Dispatch City of Del Rio Police Dispatch City of Del Rio Traffic Operations Center City of Del Rio Transit Dispatch City of Del Rio Web Site DPS Communications Service Independent School District Dispatch National Weather Service Private Sector Transit System Dispatch Rail Operations Centers TxDOT 511 System TxDOT Del Rio Traffic Operations Center TxDOT Laredo District Web Page Val Verde County Road and Bridge Precincts Val Verde EMS Dispatch	City of Del Rio	Future
			TxDOT Del Rio	Future
MC07	Roadway Maintenance and Construction	City of Del Rio Field Equipment City of Del Rio Maintenance Dispatch City of Del Rio Storage Yard City of Del Rio Streets Department Vehicles City of Del Rio Traffic Maintenance City of Del Rio Traffic Operations Center TxDOT Del Rio Field Equipment TxDOT Del Rio Traffic Operations Center TxDOT Maintenance Sections TxDOT Maintenance Section Storage Facility TxDOT Maintenance Vehicles Val Verde County Road and Bridge Precincts Val Verde County Road and Bridge Vehicles	City of Del Rio	Future
			TxDOT Del Rio	Future

Table 5 – Del Rio Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
MC08	Work Zone Management	City of Del Rio Centralized Dispatch Center	TxDOT Del Rio	Future
		City of Del Rio Field Equipment	City of Del Rio	Future
		City of Del Rio Fire Department	Val Verde County	Future
		City of Del Rio Maintenance Dispatch		
		City of Del Rio Paratransit Dispatch		
		City of Del Rio Police Dispatch		
		City of Del Rio Streets Department Vehicles		
		City of Del Rio Traffic Operations Center		
		City of Del Rio Transit Dispatch		
		City of Del Rio Web Site		
		DPS Communications Service		
		Independent School District Dispatch		
		Local Print and Broadcast Media		
		Private Sector Traveler Information Services		
		TxDOT 511 System		
		TxDOT Del Rio ITS Field Equipment		
		TxDOT Del Rio Traffic Operations Center		
		TxDOT Laredo District Web Page		
		TxDOT Laredo TMC – STRATIS		
		TxDOT Maintenance Sections		
		TxDOT Maintenance Vehicles		
		Val Verde County Road and Bridge Precincts		
		Val Verde County Road and Bridge Vehicles		
		Val Verde County Sheriff Communications Center		
		Val Verde EMS Dispatch		
MC09	Work Zone Safety Monitoring	City of Del Rio Field Equipment	City of Del Rio	Future
		City of Del Rio Maintenance Dispatch	TxDOT Del Rio	Future
		City of Del Rio Streets Department Vehicles		
		TxDOT Del Rio Field Equipment		
		TxDOT Maintenance Sections		
		TxDOT Maintenance Vehicles		

Table 5 – Del Rio Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
MC10	Maintenance and Construction Activity Coordination	City of Del Rio Centralized Dispatch City of Del Rio Fire Department City of Del Rio Gas Dispatch Center City of Del Rio Maintenance Dispatch City of Del Rio Paratransit Dispatch City of Del Rio Police Department City of Del Rio Traffic Operations Center City of Del Rio Transit Dispatch City of Del Rio Water/Wastewater Dispatch Center City of Del Rio Web Site DPS Communications Service Independent School District Dispatch Local Print and Broadcast Media Other TxDOT District Maintenance Sections Private Sector Traveler Information Services Private Utility Company Dispatch Rail Operations Centers TxDOT BRINSAP TxDOT Del Rio Traffic Operations Center TxDOT Highway Conditions Reporting System TxDOT Laredo District Public Information Office TxDOT Maintenance Sections Val Verde County Road and Bridge Precincts Val Verde County Sheriff Communications Center Val Verde EMS Dispatch	TxDOT Del Rio	Future
			City of Del Rio	Future
APTS1	Transit Vehicle Tracking	City of Del Rio Fixed Route Transit Vehicles City of Del Rio Paratransit Dispatch City of Del Rio Paratransit Vehicles City of Del Rio Transit Dispatch Independent School District Buses Independent School District Dispatch	Transit Agencies	Future

Table 5 – Del Rio Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
APTS2	Transit Fixed-Route Operations	City of Del Rio Fixed Route Transit Vehicles City of Del Rio Maintenance Dispatch City of Del Rio Traffic Operations Center City of Del Rio Transit Dispatch Independent School District Buses Independent School District Dispatch TxDOT Del Rio Traffic Operations Center TxDOT Maintenance Sections	Transit Agencies	Future
APTS3	Demand Response Transit Operations	City of Del Rio Maintenance Dispatch City of Del Rio Paratransit Dispatch City of Del Rio Paratransit Vehicles City of Del Rio Public Access City of Del Rio Traffic Operations Center City of Del Rio Web Site TxDOT Del Rio Traffic Operations Center TxDOT Maintenance Sections Val Verde County Road and Bridge Precincts	City of Del Rio	Future
APTS5	Transit Security	City of Del Rio Centralized Dispatch Center City of Del Rio Fire Department City of Del Rio Fixed Route Transit Vehicles City of Del Rio Paratransit Dispatch City of Del Rio Paratransit Vehicles City of Del Rio Police Dispatch City of Del Rio Transit Dispatch Independent School District Buses Independent School District Dispatch Independent School District Police Dispatch	Transit Agencies	Future
APTS6	Transit Maintenance	City of Del Rio Fixed Route Transit Vehicles City of Del Rio Paratransit Dispatch City of Del Rio Paratransit Vehicles City of Del Rio Transit Dispatch Independent School District Buses Independent School District Dispatch	Transit Agencies	Future

Table 5 – Del Rio Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
APTS7	Multi-modal Coordination	AMTRAK Passenger Terminal City of Del Rio Paratransit Dispatch City of Del Rio Transit Dispatch Del Rio Regional Airport Private Sector Transit System Dispatch Private Taxi Provider Dispatch	City of Del Rio	Future
APTS8	Transit Traveler Information	City of Del Rio Paratransit Dispatch City of Del Rio Public Access City of Del Rio Transit Dispatch City of Del Rio Web Site Private Travelers Personal Computing Devices	City of Del Rio	Future
CVO03	Electronic Clearance	Commercial Vehicle Operator Systems Commercial Vehicles DPS Electronic Screening Stations DPS License and Weights Division Other States Credentials Administration and Safety Systems TxDOT Credentials Administration and Safety Information Exchange US BCBP Customs Product Manifest System US BCBP Electronic Clearance System	DPS	Future
			US Customs	Future
CVO10	HAZMAT Management	City of Del Rio Centralized Dispatch Center City of Del Rio Police Dispatch Commercial Vehicle Operator Systems Commercial Vehicles DPS Communications Service Laughlin AFB Operations Center Val Verde County Rural Volunteer Fire Val Verde County Sheriff Communications Center	City of Del Rio	Future
			DPS	Future

Table 5 – Del Rio Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
ATIS1	Broadcast Traveler Information	City of Del Rio Traffic Operations Center City of Del Rio Web Site Local Print and Broadcast Media Private Sector Traveler Information Services Private Travelers Personal Computing Devices TxDOT 511 System TxDOT Del Rio Traffic Operations Center TxDOT Highway Conditions Reporting System TxDOT Laredo District Web Page US BCBP Border Patrol Communications Center US BCBP CASC US BCBP Web Site	TxDOT Laredo	Future
			City of Del Rio	Future
			US BCBP	Future
ATIS2	Interactive Traveler Information	Private Travelers Personal Computing Devices TxDOT Laredo District Web Page	TxDOT Laredo	Future
ATIS5	ISP Based Route Guidance	City of Del Rio Traffic Operations Center Commercial Vehicle Operator Systems Private Travelers Personal Computing Devices TxDOT Del Rio Traffic Operations Center TxDOT Motor Carrier Routing Information	TxDOT	Future
AD1	ITS Data Mart	City of Del Rio Police Dispatch Crash Data Users Del Rio Regional Planning Data System Users DPS Communications Service Independent School District Police Dispatch Statewide Crash Records Information System TxDOT Del Rio Traffic Operations Center TxDOT Laredo Archived Data Management System Val Verde County Sheriff Communications Center	TxDOT	Future
			DPS	Future

Table 5 – Del Rio Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
AD2	ITS Data Warehouse	City of Del Rio Asset Inventory City of Del Rio Gas Dispatch Center City of Del Rio Maintenance Dispatch City of Del Rio Paratransit Dispatch City of Del Rio Traffic Operations Center City of Del Rio Transit Dispatch City of Del Rio Water/Wastewater Dispatch Center Del Rio Regional Planning Data System Users	City of Del Rio	Future

4.3 Interconnections

4.3.1 Top Level Regional System Interconnect Diagram

A system interconnect diagram, or sausage diagram (shown previously in **Figure 4**), shows the systems and primary interconnects in the Region. The National ITS Architecture interconnect diagram has been customized for the Del Rio Region based on the information gathered from the stakeholders and system inventory. **Figure 5** summarizes the existing, planned, and future ITS elements for the Del Rio Region in the context of a physical interconnect. Subsystems and elements specific to Del Rio are called out in the boxes surrounding the main interconnect diagram, and these are color-coded to the subsystem to which they are associated. Elements with an asterisk (*) are planned and future system elements.

4.3.2 Customized Market Packages

The market packages in the National ITS Architecture were customized to reflect the unique systems, subsystems, and terminators in the Del Rio Region. Each market package is shown graphically, with the market package name, Del Rio-specific element, and with the unique agency and system identifiers within the subsystems and terminators.

Figure 6 is an example of an ATMS market package for Surface Street Control that has been customized for the Del Rio Region. This market package shows the two subsystems, Traffic Management and Roadway, and the associated entities (City of Del Rio TOC, TxDOT Del Rio TOC, City of Del Rio Field Equipment and TxDOT Del Rio ITS Field Equipment). Data flows between the subsystems and/or terminators indicate what information is being shared.

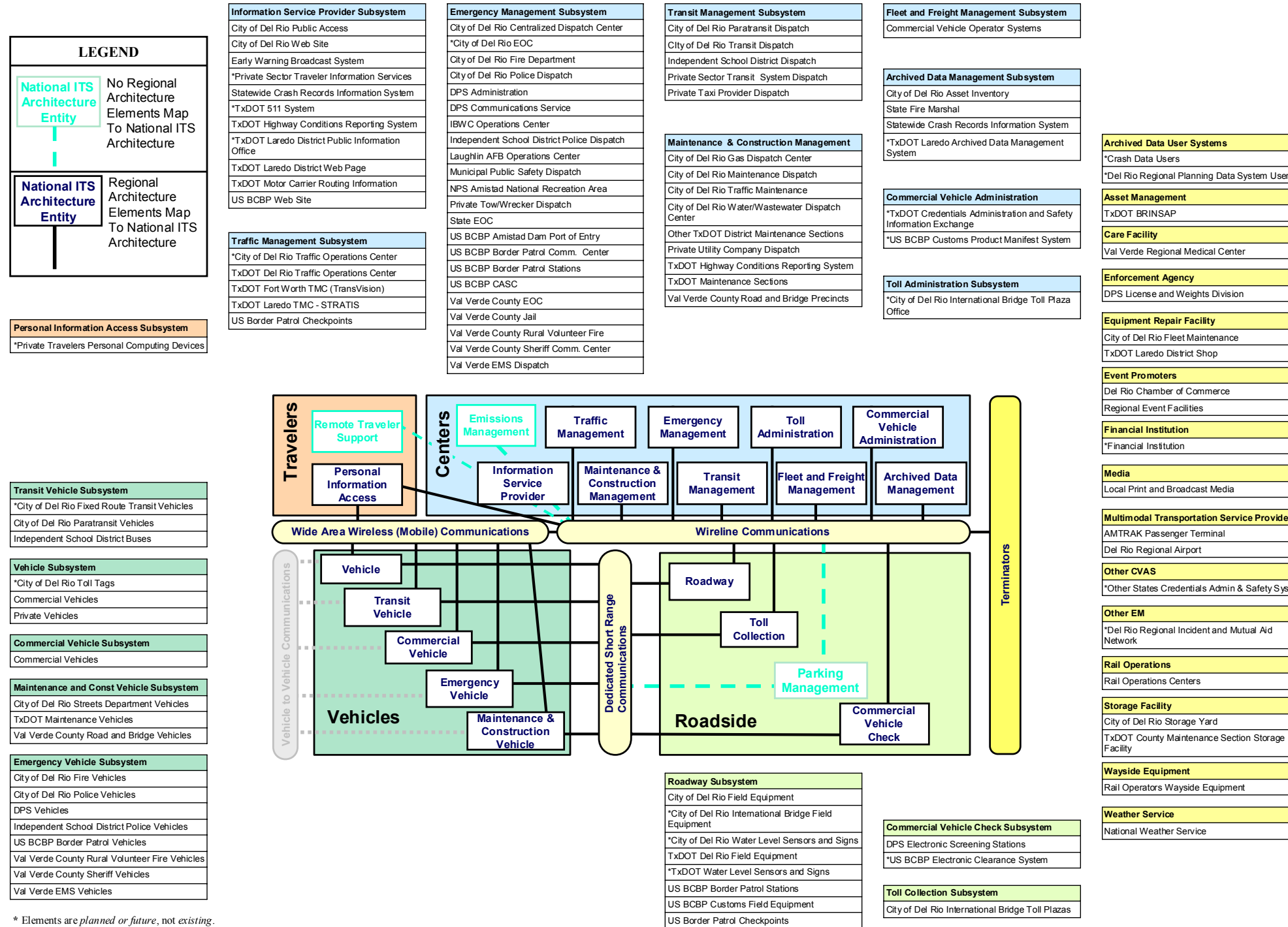


Figure 5 – Del Rio Regional System Interconnect Diagram

Market packages that were customized for the Del Rio Region are shown in **Appendix A**. These market packages also are included on the Del Rio Regional ITS Architecture web site by selecting the “Market Package” button. Market packages are grouped by functional area (Traffic Management, Maintenance and Construction, Public Transportation, etc.), and each of the customized market packages can be viewed by clicking on the Market Package Diagram icon under each area heading. It is important to note that while the market package table on the web site shows all of the available market packages from the National ITS Architecture, only those selected for the Del Rio Region are included in the diagrams. The selected market packages on the web site also are highlighted in the table with bold print, and are indicated as existing or planned.

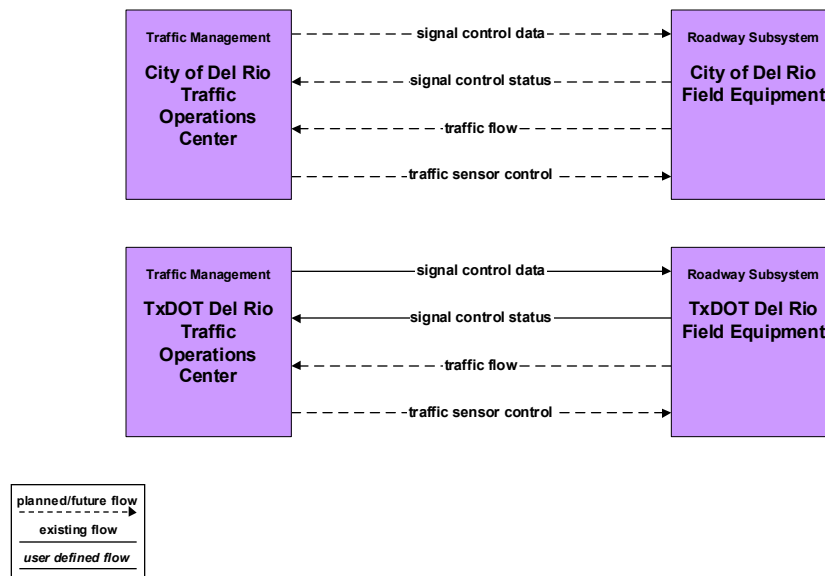


Figure 6 – Custom Market Package for Del Rio Surface Street Control

4.3.3 Del Rio Architecture Interfaces

While it is important to identify the various systems and stakeholders as part of a regional ITS, a primary purpose of the architecture is to identify the *connectivity* between transportation systems in the Del Rio Region. The interconnect diagram shown previously in **Figure 5** showed the high-level relationships of the subsystems and terminators in the Del Rio Region and the associated local projects and systems. The customized market packages represent services that can be deployed as an integrated capability, and the market package diagrams show the information flows between the subsystems and terminators that are most important to the operation of the market packages. How these systems interface with each other is an integral part of the overall ITS architecture.

There are 105 different elements identified as part of the Del Rio Regional ITS Architecture. These elements include local and state TMCs, transit vehicles, dispatch systems, emergency management agencies, media outlets, and others – essentially, all of the existing and planned physical components that contribute to the regional intelligent transportation system. Interfaces have been identified for each element in the Del Rio Regional ITS Architecture, and each element has been mapped to those other elements with

which it must interface. For example, the City of Del Rio Traffic Operations Center (TOC) has existing or planned interfaces with 33 other elements in the Del Rio Region, ranging from field equipment and dispatch centers, to transit and emergency operations centers. Other interfaces are far less complex, such as the interface between the City of Del Rio Police Vehicles and the City of Del Rio Police Dispatch.

An example of one of the system interfaces is shown in **Figure 7**. This graphic shows the TxDOT Del Rio ITS Field Equipment and the existing and planned interfaces with other elements throughout the Region. These interfaces are shown as existing, planned, or future. Interfaces defined as planned have funding identified, while future interfaces are desired by stakeholders but funding has not yet been identified.

Each element and its defined interfaces are listed in **Appendix B**. Elements and their interfaces also are accessible via the Del Rio Regional ITS Architecture web site by clicking on the “Interfaces” button. Elements are listed alphabetically in the column on the left, and each entry in the Interfacing Element column on the right is a link to more detailed information about the particular interface. The architecture flows between the individual element interfaces are described in more detail in the following section.

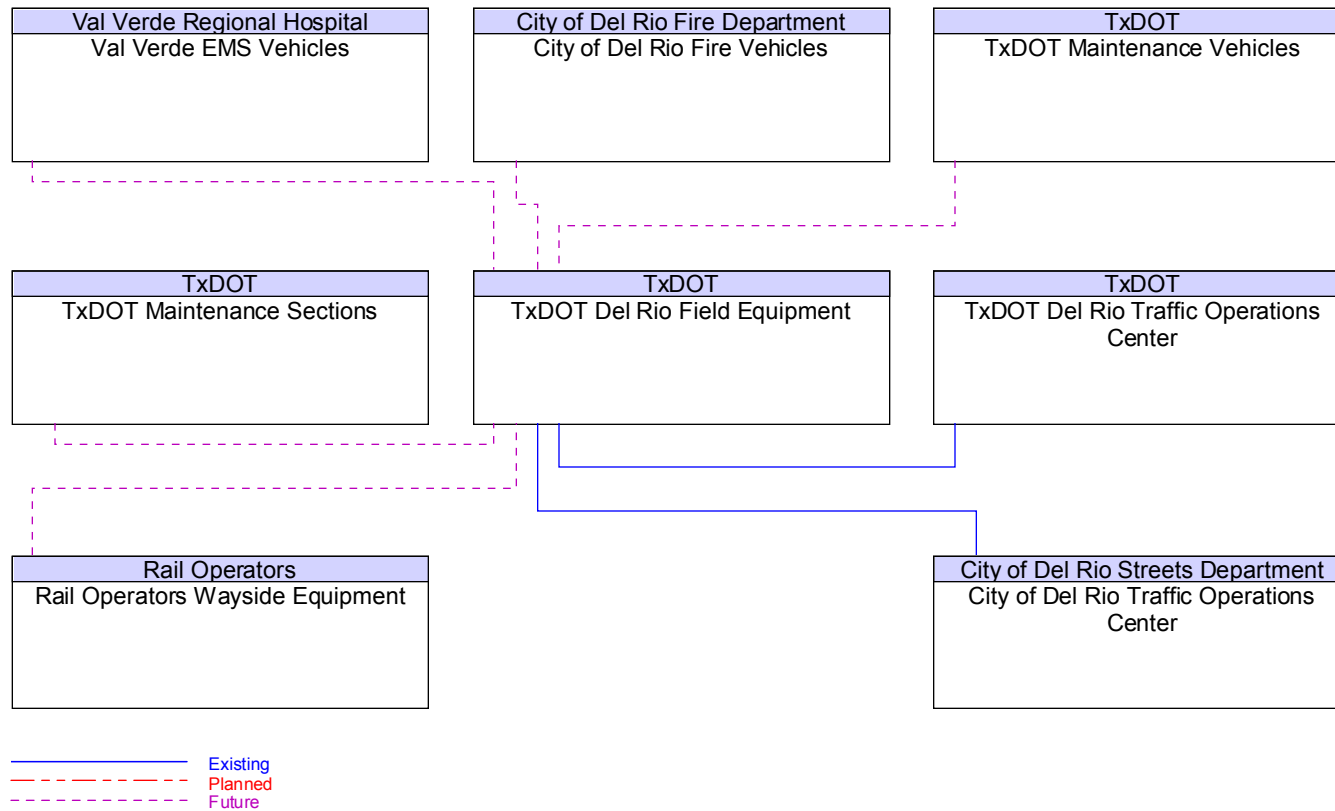


Figure 7 – TxDOT Del Rio Field Equipment Interfaces

4.3.4 Physical Subsystem Architecture Flows

Architecture flows between the subsystems and terminators define the specific information (data) that is exchanged between subsystems and terminators. Each architecture flow has one or more data flows that specify what information is exchanged and the direction of the exchange. These data flows could be requests for information, alerts and messages, status requests, broadcast advisories, event messages, confirmations, and other key information requirements. These architecture flows define the interface requirements between the various elements in the Del Rio Regional ITS Architecture.

An example of the architecture flows between two elements is shown in **Figure 8**. In this interface, the flows between the City of Del Rio TOC and the City’s Field Equipment show information that must go from the TOC to the field equipment, as well as information that the TOC needs from devices. Similar to the interfaces, architecture flows also are defined as existing, planned, or future.

Each of the individual element interfaces can be accessed on the Del Rio Regional ITS Architecture web site by clicking on the “Interfaces” button. Selecting any of the interfacing elements from the column on the right will display an interface diagram and architecture flows between two specific elements, similar to the diagram shown in **Figure 8**. Each data flow is defined, and any standards associated with that data flow are noted. Standards that apply to the Del Rio Region are discussed in more detail in Section 4.5.

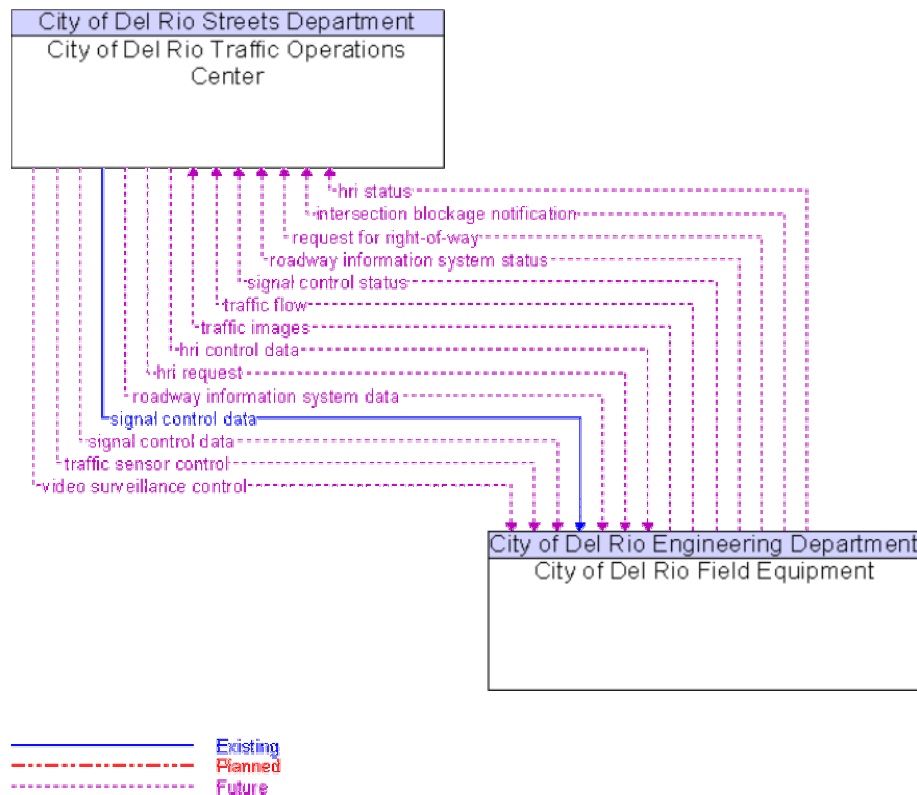


Figure 8 – City of Del Rio TOC to Field Equipment Architecture Flows

4.4 Functional Requirements

Functions are a description of what the system has to do. In the National ITS Architecture, functions are defined at several different levels, ranging from general subsystem descriptions through somewhat more specific equipment package descriptions to Process Specifications that include substantial detail. Guidance from the USDOT on developing a Regional ITS Architecture recommends that each Region determine the level of detail of the functional requirements for their Region. In the Del Rio Region, it is recommended that the development of detailed functional requirements such as the “shall” statements included in Process Specifications for a system be developed at the project level. These detailed “shall” statements identify all functions that a project or system needs to perform.

For the Del Rio Regional ITS Architecture, functional requirements have been identified at two levels. The customized market packages, included in Section 4.3.2, describe the services that ITS needs to provide in the Region and the architecture flows between the elements. These market packages and data flows describe what the ITS system in Del Rio has to do and the data that needs to be shared among elements.

At a more detailed level, functional requirements for the Del Rio Region also are described in terms of equipment packages that are associated with one or more subsystems in the Del Rio Regional ITS Architecture as shown in **Table 6**. An equipment package is a functional capability that could be deployed at a specific time. Each equipment package can be linked in the National ITS Architecture to the Process Specifications that might be applicable. It is recommended that during the design concept stage of a project, the applicable equipment package and associated Process Specifications from the National ITS Architecture be reviewed by the implementer to determine the appropriate functional requirements for the project. A link for each equipment package is available on the Del Rio Regional ITS Architecture web site by clicking on the “Functions” button.

Table 6 – Del Rio Region Equipment Packages

Subsystem	Equipment Package
Archived Data Management Subsystem	Government Reporting Systems Support
	ITS Data Repository
	On-Line Analysis and Mining
	Traffic and Roadside Data Archival
Commercial Vehicle Administration Subsystem	CV Data Collection
	CV Information Exchange
	CV Safety Administration
Commercial Vehicle Check Subsystem	Citation and Accident Electronic Recording
	Roadside Electronic Screening
Commercial Vehicle Subsystem	On-Board Cargo Monitoring
	On-board CV Electronic Data
Emergency Management Subsystem	Emergency Call-Taking
	Emergency Data Collection
	Emergency Dispatch
	Emergency Environmental Monitoring
	Emergency Response Management
	Mayday Support

Table 6 – Del Rio Region Equipment Packages (continued)

Subsystem	Equipment Package
Emergency Vehicle Subsystem	On-board EV En Route Support
	On-Board EV Environmental Monitoring
	On-board EV Incident Management Communication
Emissions Management Subsystem	Emissions Data Collection
Fleet and Freight Management Subsystem	Fleet Administration
	Fleet HAZMAT Management
Information Service Provider Subsystem	Basic Information Broadcast
	Infrastructure Provided Route Selection
	Interactive Infrastructure Information
	ISP Data Collection
	ISP Probe Information Collection
Maintenance and Construction Management Subsystem	MCM Data Collection
	MCM Environmental Information Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Maintenance Decision Support
	MCM Roadway Maintenance and Construction
	MCM Vehicle and Equipment Maintenance Management
	MCM Vehicle Tracking
	MCM Work Activity Coordination
	MCM Work Zone Management
MCM Work Zone Safety Management	
Maintenance and Construction Vehicle Subsystem	MCV Environmental Monitoring
	MCV Infrastructure Monitoring
	MCV Roadway Maintenance and Construction
	MCV Vehicle Location Tracking
	MCV Vehicle Safety Monitoring
	MCV Vehicle System Monitoring and Diagnostics
	MCV Work Zone Support
Parking Management Subsystem	Parking Data Collection
Personal Information Access Subsystem	Personal Basic Information Reception
	Personal Interactive Information Reception
	Personal Location Determination
	Personal Provider-Based Route Guidance
Remote Traveler Support Subsystem	Remote Basic Information Reception
	Remote Interactive Information Reception
	Remote Mayday I/F
	Remote Transit Information Services
	Secure Area Monitoring
Roadway Subsystem	Advanced Rail Crossing
	Roadside Data Collection
	Roadside Signal Priority
	Roadway Basic Surveillance
	Roadway Environmental Monitoring
	Roadway Equipment Coordination

Table 6 – Del Rio Region Equipment Packages (continued)

Subsystem	Equipment Package
Roadway Subsystem (continued)	Roadway Incident Detection
	Roadway Infrastructure Monitoring
	Roadway Probe Beacons
	Roadway Signal Controls
	Roadway Traffic Information Dissemination
	Roadway Work Zone Safety
	Roadway Work Zone Traffic Control
	Standard Rail Crossing
Toll Administration Subsystem	Toll Administration
	Toll Data Collection
Toll Collection Subsystem	Toll Plaza Toll Collection
Traffic Management Subsystem	Collect Traffic Surveillance
	HRI Traffic Management
	Rail Operations Coordination
	TMC Environmental Monitoring
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Multimodal Coordination
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Signal Control
	TMC Traffic Information Dissemination
	TMC Work Zone Traffic Management
	Traffic Data Collection
	Traffic Maintenance
	Transit Management Subsystem
Transit Center Information Services	
Transit Center Multi-Modal Coordination	
Transit Center Paratransit Operations	
Transit Center Security	
Transit Center Tracking and Dispatch	
Transit Data Collection	
Transit Environmental Monitoring	
Transit Garage Maintenance	
Transit Garage Operations	
Transit Vehicle Subsystem	On-Board Environmental Monitoring
	On-board Fixed Route Schedule Management
	On-board Maintenance
	On-board Paratransit Operations
	On-board Transit Information Services
	On-board Transit Security
	On-board Transit Signal Priority
	On-board Transit Trip Monitoring

Table 6 – Del Rio Region Equipment Packages (continued)

Subsystem	Equipment Package
Vehicle Subsystem	Basic Vehicle Reception
	Interactive Vehicle Reception
	Smart Probe
	Vehicle Location Determination
	Vehicle Mayday I/F
	Vehicle Probe Support
	Vehicle Provider-Based Route Guidance
	Vehicle Safety Monitoring System
	Vehicle Toll/Parking Interface

4.5 Standards

Standards are an important tool that will allow efficient implementation of the elements in the Del Rio Regional ITS Architecture over time. Standards facilitate deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances, vendors change, and as new approaches evolve. The USDOT’s ITS Joint Program Office is supporting Standards Development Organizations (SDOs) with an extensive, multi-year program of accelerated, consensus-based standards development to facilitate successful ITS deployment in the United States. **Table 7** identifies each of the ITS standards that could apply to the Del Rio Regional ITS Architecture. These standards are based on the physical subsystem architecture flows identified in Section 4.3.4. The connection of each standard to the applicable architecture flows between elements can be viewed on the Del Rio Regional ITS Architecture web site by clicking on the “Interfaces” or “Standards” buttons.

Table 7 – Applicable ITS Standards for the Del Rio Region

SDO	Document ID	Title	Type
AASHTO/ITE/NEMA	NTCIP 1201	Global Object Definitions	Message
	NTCIP 1202	Object Definitions for Actuated Traffic Signal Controller Units	Message
	NTCIP 1203	Object Definitions for Dynamic Message Signs	Message
	NTCIP 1204	Object Definitions for Environmental Sensor Stations and Roadside Weather Information System	Message
	NTCIP 1205	Data Dictionary for Closed Circuit Television (CCTV)	Message
	NTCIP 1206	Data Collection and Monitoring Devices	Message
	NTCIP 1208	Object Definitions for Video Switches	Message
	NTCIP 1209	Transportation System Sensor Objects	Message
	NTCIP 1210	Objects for Signal Systems Master	Message
	NTCIP 1211	Objects for Signal Control Priority	Message
	NTCIP 1301	Message Set for Weather Reports	Message
	NTCIP 1401	TCIP – Common Public Transportation (CPT) Business Area Standard	Message

Table 7 – Applicable ITS Standards for the Del Rio Region (continued)

SDO	Document ID	Title	Type
AASHTO/ITE/NEMA (continued)	NTCIP 1402	TCIP – Incident Management (IM) Business Area Standard	Message
	NTCIP 1403	TCIP – Passenger Information (PI) Business Area Standard	Message
	NTCIP 1404	TCIP – Scheduling/Runcutting (SCH) Business Area Standard	Message
	NTCIP 1405	TCIP – Spatial Representation (SP) Business Area Standard	Message
	NTCIP 1406	TCIP – Onboard (OB) Business Area Standard	Message
	NTCIP 1407	TCIP – Control Center (CC) Business Area Standard	Message
	NTCIP 1408	TCIP – Fare Collection (FC) Business Area Standard	Message
	Various	NTCIP Center-to-Center Standards Group	Communication
	Various	NTCIP Center-to-Field Standards Group	Communication
ANSI	ANSI TS285	Commercial Vehicle Safety and Credentials Information Exchange	Message
	ANSI TS286	Commercial Vehicle Credentials	Message
ASTM	ASTM 5 GHz Data Link	Standard Specification for 5.9 GHz Data Link Layer	Communication
	ASTM 5 GHz Phys	Standard Specification for 5.9 GHz Physical Layer	Communication
	ASTM DD 17.54.00.2	ADMS Data Dictionary Specifications	Data
	ASTM PS 105-99	Specification for Dedicated Short Range Communication (DSRC) Data Link Layer: Medium Access and Logical Link Control	Communication
	ASTM PS 111-98	Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz	Communication
EIA/CEA	CEA/EIA-794	Data Radio Channel (DARC) System	Communication
	CEA/EIA-795	Subcarrier Traffic Information Channel (STIC) System	Communication
IEEE	IEEE P1512.1	Standard for Traffic Incident Management Message Sets for Use by EMCs	Message
	IEEE P1512.2	Standard for Public Safety IMMS for use by EMCs	Message
	IEEE P1512.3	Standard for Hazardous Material IMMS for use by EMCs	Message
	IEEE P1512.a	Standard for Emergency Management Data Dictionary	Data
	IEEE P1512-2000	Standard for Common Incident Management Message Sets (IMMS) for use by EMCs	Message
	IEEE P1556	Security/Privacy of Vehicle/RS Communications including Smart Card Communications	Communication
	IEEE P1570	Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection	Message
	IEEE Std 1455-1999	Standard for Message Sets for Vehicle/Roadside Communications	Message

Table 7 – Applicable ITS Standards for the Del Rio Region (continued)

SDO	Document ID	Title	Type
ITE	ITE TM 1.03	Standard for Functional Level Traffic Management Data Dictionary (TMDD)	Data
	ITE TM 2.01	Message Sets for External TMC Communication (MS/ETMCC)	Message
SAE	SAE J1746	ISP-Vehicle Location Referencing Standard	Data
	SAE J2313	On-Board Land Vehicle Mayday Reporting Interface	Message
	SAE J2353	Data Dictionary for Advanced Traveler Information System (ATIS)	Data
	SAE J2354	Message Set for Advanced Traveler Information System (ATIS)	Message
	SAE J2369	Standard for ATIS Message Sets Delivered Over Bandwidth Restricted Media	Message
	SAE J2529	Rules for Standardizing Street Names and Route IDs	Message
	SAE J2540	Messages for Handling Strings and Look-Up Tables in ATIS Standards	Message

4.6 Phases of Implementation

The Regional ITS Architecture will be implemented through a series of projects led by both public sector and private sector agencies. Key foundation systems will need to be implemented in order to support other systems that have been identified in the Regional ITS Architecture. The deployment of all of the systems required to achieve the final Regional ITS Architecture build out will occur over many years.

A sequence of projects and their respective time frames have been identified in the Del Rio Regional ITS Deployment Plan. These projects have been sequenced over a 20-year period, with projects identified for deployment in 5-, 10- and 20-year timeframes.

Some of the key market packages that will provide the functions for the key foundation systems in the Del Rio Region are listed below. Projects associated with these and other market packages identified for the Region have been included in the Del Rio Regional ITS Deployment Plan.

- Network Surveillance;
- Surface Street Control;
- Road Weather Data Collection;
- Weather Information Processing and Distribution;
- Transit Vehicle Tracking; and
- Broadcast Traveler Information.

In addition to the above market packages, the implementation of an appropriate communications system in the Region to support ITS is critical for continued deployment of projects.

5. OPERATIONAL CONCEPT

The operational concept for the Del Rio Region provides a description of the stakeholders' roles and responsibilities in the operation of the systems that currently exist or that are being proposed. This operational concept provides an "executive summary" view of the way the Del Rio Region's systems will work together, and it documents the roles and responsibilities for each of the services that ITS will provide. The approach to describing the operational concept is to present specific operational scenarios that describe and define the stakeholders' general roles in providing the services.

In addition to the operational scenarios that illustrate the roles and responsibilities of each agency, a list of the key agencies that are responsible for operations in the eight ITS areas is presented. This list will serve as a high level overview of the different roles and responsibilities in this operational concept. In addition, specific roles and coordination requirements for operations are illustrated through the customized market package diagrams presented in **Appendix A**.

With the integration, information sharing, and in some cases joint operations of systems, there will likely be a requirement for agency agreements. Descriptions of potential agreements that may be needed in the Del Rio Region are included in Section 5.3.

5.1 Operational Scenarios

Scenario 1

The first operational scenario describes how the integrated elements of the Del Rio Region's ITS program will function together in the event of a HAZMAT spill near the border crossing at the International Bridge. In this operational scenario, some local arterials are instrumented with permanent DMS and major intersections in the City of Del Rio have CCTV cameras for monitoring. These systems are controlled from the City of Del Rio TOC. The TxDOT Del Rio TOC and STRATIS also facilitate information sharing with motorists on state routes approaching the city and STRATIS has operational control of the TxDOT systems in the Del Rio area when their TOC is not operational.

A motorist's cellular phone 911 call is received and the City of Del Rio police dispatch is notified of a crash at a busy intersection. The dispatcher logs the incident details and dispatches an officer as well as electronically notifies the City of Del Rio TOC to find out if video coverage exists at that intersection. The City of Del Rio TOC locates the incident on a camera and sharing the image with the police dispatcher they see that a HAZMAT vehicle is involved and that there is a potential spill. The officer on scene is notified to proceed with caution while TOC operators attempt to read the license plate from the truck and determine the contents. The camera is not in an ideal position to read the plate so the TOC contacts the U.S. Customs office at the International Bridge and asks their operators to get the plate number using their cameras. A message is automatically routed to the City of Del Rio Streets Department, TxDOT Del Rio Area Office, and the Regional EOC requesting HAZMAT crews to assist with incident clearance. The truck is carrying an extremely dangerous substance and since the extent of damage to the vehicle indicates that a leak is likely, emergency officials decide to evacuate the immediate area to limit exposure during the clean up process. The border crossing is closed to traffic entering and leaving the United States. All non-essential border patrol and customs personnel are evacuated.



Messages are immediately placed on DMS throughout the Region to notify motorists of the closure. The DMS that normally display wait times now alert motorists that the border crossing is closed and passenger vehicles should use the Amistad Dam Crossing instead. The City of Del Rio crews close down streets in a one mile radius of the incident, and place portable DMS on approaches to divert motorists. Local media are informed of the incident and closure, and they broadcast via radio and TV reports that several streets and the border crossing at the International Bridge will be closed for several hours. TxDOT updates the Highway Closure and Restriction web page, HAR, and 511 traveler information phone number with the information. The center-to-center communications links allow for instantaneous dissemination of the same message to multiple agencies. With the regional integration and notification systems, the DPS alert also is sent to local emergency response and public safety, including the County EOC, local police, and area hospitals to alert them of the incident.

Scenario 2

A storm with the potential for heavy rains is approaching the Del Rio Region. The Emergency Operations Center is watching the storm and has alerted the City of Del Rio Transit that their services may be needed to evacuate low lying areas if the rain begins falling around Del Rio.

The rains begin and forecasts predict that several inches will fall in a matter of hours. Officials know that this will cause flooding in many areas of the Region. Before waters rise too much, Del Rio Transit vehicles are dispatched to help evacuate residents in rural areas prone to flooding.

As the waters rise, flood detection stations report back to the TxDOT Del Rio TOC that several roadways have become impassable. As part of the flood detection system, in particularly dangerous areas where the flood conditions can be underestimated, automatic closure systems are also in place. Cross arms close roadways approaching bridges with water rushing over them, underpasses filled with water and other flooded locations.

The TxDOT Del Rio TOC also sends a message to the City of Del Rio Centralized Dispatch Center and Val Verde County so that when emergency vehicles are dispatched the drivers are cognizant of the closures and can take the appropriate detours.

Messages are placed on DMS approaching the Region to warn of the flood conditions that exist and encourage that, unless necessary, motorists avoid the areas affected by the flood. Flooding has been a serious problem in the Del Rio Region for many years and will continue to be a threat, but as demonstrated in this scenario, ITS applications can aid in detection, evacuation and information dissemination and result in increased safety for residents of the Del Rio Region.

5.2 Roles and Responsibilities

The operational scenarios described in the previous section illustrate the interagency cooperation and coordination that is required in two situations that might occur in the Del Rio Region. During any operational scenario, a number of agencies will be required to coordinate closely to perform their operational responsibilities. The key agencies that have a lead role or responsibility during operations are listed below for each ITS area. It is recognized that a number of other agencies will also need to be involved during a scenario in addition to the ones listed below, although it is not expected that these agencies will play as critical a role in operations.

Travel and Traffic Management

- City of Del Rio
- Val Verde County Road and Bridge
- Texas Department of Transportation Laredo District
- Texas Department of Transportation Del Rio Area Office
- Other Texas Department of Transportation Districts
- Texas Department of Public Safety

Public Transportation Management

- Independent School Districts
- City of Del Rio Transit

Electronic Payment

- City of Del Rio

Commercial Vehicle Operations

- Texas Department of Public Safety
- Texas Department of Transportation

Emergency Management

- City of Del Rio (Police, Fire, Emergency Operations Center, Traffic)
- Val Verde County Public Safety (Sheriff's Office, Emergency Operations Center)
- Regional Hospitals
- Texas Department of Public Safety
- Texas Department of Transportation

Advanced Vehicle Safety System Needs

- Not Applicable

Information Management

- Texas Department of Transportation
- City of Del Rio

Maintenance and Construction Management

- City of Del Rio
- Val Verde County Road and Bridge
- Texas Department of Transportation



5.3 Del Rio Agreements

The Regional ITS Architecture for the Del Rio Region has identified several agency interfaces, information exchanges, and integration strategies that would be needed to provide the ITS services and systems identified by the stakeholders in the Region. Interfaces and data flows among public and private entities in the Del Rio Region will require agreements among agencies that establish parameters for sharing agency information to support traffic management, incident management, provide traveler information, and other functions identified in the Regional ITS Architecture.

Currently, there are no formal agreements in place in the Del Rio Region with regards to ITS. Stakeholders indicated that while there is a high degree of cooperation among agencies, there hasn't been a need for formal agreements to facilitate multi-jurisdictional resource sharing and cooperation. With the implementation of ITS technologies, integrating systems from one or more agencies, the anticipated level of information exchange identified in the architecture, it is likely that more formal agreements will be needed. These agreements, while perhaps not requiring a financial commitment from agencies in the Region, should outline specific roles, responsibilities, data exchanges, levels of authority, and other facets of regional operations. Some agreements also will outline specific funding responsibilities, where appropriate and applicable.

Table 8 provides a list of potential agreements for the Del Rio Region based on the interfaces identified in the Regional Architecture. It is important to note that as ITS services and systems are implemented in the Region, part of the planning and review process for those projects should include a review of potential agreements that would be needed for implementation or operations.

Table 8 – Potential Agreements for the Del Rio Region

Agreement and Agencies	Status	Agreement Description	Considerations
<p>Data Sharing and Usage (Public) TxDOT Laredo District and Public Agencies within the Region</p>	<p>Future</p>	<p>This agreement would define the parameters, guidelines and policies for inter- and intra-agency ITS data sharing. This data sharing would support regional activities related to traffic management, incident management, and traveler information, and other functions. The terms of this agreement should generally address such items as:</p> <ul style="list-style-type: none"> ▪ Types of data and information to be shared ▪ Repository for information (i.e., TxDOT Laredo TMC or Del Rio Area TOC as central hub) ▪ How the information will be used (traffic incident management, displayed on web site for travel information, distributed to private media, etc.) ▪ Parameters for data format, quality, security 	<p>These agreements are typically zero-dollar agreements, in that there is no charge among agencies for the actual data, although there might be some cost incurred for infrastructure, systems or fiber to enable communications between agencies.</p>

Table 8 – Potential Agreements for the Del Rio Region (continued)

Agreement and Agencies	Status	Agreement Description	Considerations
<p>Data Sharing and Usage (Public-Private) TxDOT Laredo District and Private Media/Information Service Providers</p>	Future	<p>This agreement would define the parameters, guidelines and policies for private media use of regional ITS-related information from TxDOT Laredo. This type of agreement is recommended between TxDOT (data provider) and the media (data user) to define terms of use for broadcasting public-agency information regarding traffic conditions, closures, restrictions, as well as video images. Agreements can also include requirements for the media to ‘source’ the information (i.e., using the TxDOT logo on all video images broadcast).</p>	<p>These agreements can be zero-dollar agreements, although some agencies have stipulated identifying the information, public service announcements by the media, or other requirements as a term of use. The private media entity is typically responsible for paying any necessary costs for access (i.e., communications infrastructure to link to the TxDOT database or video switch). These agreements also typically include a sunset clause to allow the agency to periodically review the agreement and make any modifications prior to renewal.</p>
<p>Shared Video Monitoring (Public) TxDOT Laredo District, City of Del Rio, State EOC, DPS, US BCBP</p>	Future	<p>This agreement would enable shared video monitoring of TxDOT CCTV cameras by public safety and emergency services agencies in the Del Rio Region for incident management purposes. This agreement would define the parameters and policies for public safety agencies to access video images via the TxDOT video switch. It is recommended that the agreement include any TxDOT policies relating to video images (including archiving, privacy, disclaimers, use of video and redistribution) as well as processes for agency requests for specific views. Shared video monitoring does not address shared use or shared control of video equipment functions.</p>	<p>These agreements are typically zero-dollar agreements, in that there is no charge among agencies for the actual data, although there might be some cost incurred for infrastructure, systems or fiber to enable communications between agencies, particularly with the high bandwidth required for transmitting live video images.</p>
<p>Mutual Aid Agreements (Public) DPS, TxDOT Laredo District, Del Rio Police, Del Rio Fire, Val Verde County Sheriff, Val Verde EMS, Val Verde Rural Volunteer Fire</p>	Existing (Informal)	<p>Mutual aid agreements currently exist as informal arrangements in the Del Rio Region, although they are a routine practice among public safety and emergency services agencies. Formal mutual aid agreements will become more important as agencies integrate systems and capabilities, particularly automated dispatch and notification.</p>	<p>These agreements are typically zero-dollar agreements, although there might be some funding required to support regional incident management activities. The agreement also would outline resource commitments that would be part of any mutual aid arrangement (personnel, equipment, facilities, etc.).</p>

Table 8 – Potential Agreements for the Del Rio Region (continued)

Agreement and Agencies	Status	Agreement Description	Considerations
<p>Joint Operations/Shared Control Agreements (Public)</p> <p>TxDOT Laredo District, City of Del Rio, US BCBP, DPS (potential)</p>	<p>Future</p>	<p>These agreements are formal arrangements to allow joint operations or control of certain systems and equipment. The agreement would need to define the terms of this arrangement, such as hours of operation and time of day/time of week where shared control would take effect, circumstances or incidents where shared control would take effect, notification procedures between the agencies agreeing to shared control arrangements, etc. Additional agencies (such as DPS) could be part of a joint operations/shared control agreement for certain types of devices.</p>	<p>Joint operations/shared control agreements could consider some form of mutual funding for certain system elements, primarily communication links.</p>