



**Louisiana Statewide Intelligent
Transportation Systems
Architecture**

Louisiana Statewide Intelligent
Transportation Systems Architecture

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LOUISIANA STATEWIDE INTELLIGENT TRANSPORTATION SYSTEMS ARCHITECTURE

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LOUISIANA STATEWIDE INTELLIGENT TRANSPORTATION SYSTEMS ARCHITECTURE

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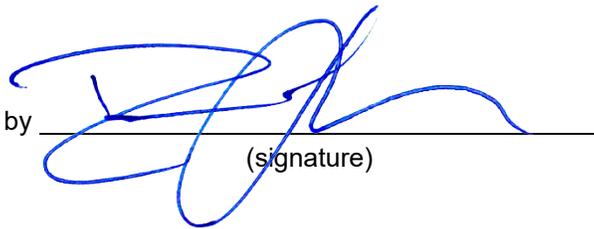
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Executive Summary

The Louisiana Statewide Intelligent Transportation Systems (ITS) Architecture document is the planning document for ITS deployment in regions primarily outside the urbanized areas of Louisiana. It is also a document that is used to articulate other ITS needs of the Louisiana Department of Transportation and Development (DOTD) to enhance safety, mobility and environmental impacts of the transportation ecosystem. The vision for DOTD is to develop a transportation system that maximizes the safety and capacity of existing transportation systems using all the tenets of transportation systems management and operations (TSMO) which includes leveraging advanced technology to address congestion, emergencies and safety. The key objectives under this vision include the following:

- Traveler delays on freeways and major arterials will be minimized through congestion mitigation such as rapid incident detection, response and clearance of all incidents, and pre-trip and en-route traveler information.
- Residents in the State especially on the coastline can be evacuated safely and rapidly during emergencies such as hurricane with continuous monitoring of traffic and public information from impact zone to safe areas for evacuees.
- Travelers within the state can make better transportation related decisions about trip need, time, route and mode based on reliable real-time information about current and forecasted traffic conditions.
- Travelers can expect a safe transportation system with advance warning systems to warn travelers of any impending danger such as weather (fog, ice, snow, wind, flooding, etc), connected vehicle (vehicle-to-vehicle, vehicle-to-infrastructure, and vehicle-to-anything)
- Use advance technology in traffic control and communications to enhance efficiency of the road network in Louisiana to reduce delays and stimulate economic growth and improve livability.

The document identifies various stakeholders and their ITS inventory that can support and enhance a safe and efficient transportation system. Various projects have been identified and ranked to address gaps in system functions and foster data integration and seamless operation of the transportation system to the benefit of the users.

This plan is intended to serve as a guide for DOTD ITS Section 56 have a framework in place to take advantage of the evolving landscape of advanced technologies that can be applied to transportation. Furthermore it identifies various partners and collaborators both within the agency (such as DOTD Safety Division, DOTD Traffic Engineering, DOTD Districts, Louisiana Transportation Research Center) and other external partners to foster collaboration and innovation to continuously innovate and deploy systems that are responsive to the transportation needs of Louisiana.



Abbreviations

AASHTO – American Association of State Highway and Transportation Officials
ASC – Actuated Traffic Signal Controller
ASD – Aftermarket Safety Device
ATIS – Advanced Traveler Information Systems
ATMS – Advanced Transportation Management System
AV – Autonomous Vehicle
AVL – Automated Vehicle Location System
AVTT – Autonomous Vehicle Technology Team
CAD – Computer Aided Dispatch
CCTV – Closed Circuit Television
CDMA – Code Division Multiple Access
CEA – Cooperative Endeavor Agreement
CFR – Code of Federal Regulations
CMU – Conflict Monitor Units
CORBA – Common Object Request Broker Architecture
CRPC – Capital Region Planning Commission
CV – Connected Vehicle
CVISN – Commercial Vehicle Information Systems Network
CVRIA – Connected Vehicle Reference Implementation Architecture
DCM – Data Collection and Monitoring
DEQ – Department of Environmental Quality
DMS – Dynamic Message Signs
DOTD – Department of Transportation and Development
DPW – Department of Public Works
DSRC – Dedicated Short-Range Communication
DTOE – District Traffic Operations Engineer
ELMS – Electrical and Lighting Management Systems
EMS – Emergency Medical Service
ESS – Environmental Sensor Stations
FAA – Federal Aviation Administration
FHWA – Federal Highway Administration
FMCSA – Federal Motor Carrier Safety Administration
FMS – Field Management Stations
FTA – Federal Transit Administration
GNOEC - Greater New Orleans Expressway Commission
GOHSEP – Governor’s Office of Homeland Security and Emergency Preparedness
GSM – Global System for Mobile Communication
HAR – Highway Advisory Radio
HAZMAT – Hazardous Materials
HOV – High Occupancy Vehicle
HRI – High-rail Intersection
IP – Internet Protocol



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ITS – Intelligent Transportation Systems
LADOTD – Louisiana Department of Transportation and Development
LONI – Louisiana Optical Network Initiative
LSP – Louisiana State Police
LTRC – Louisiana Transportation Research Center
MAP – Motorist Assistance Patrol
MPO – Metropolitan Planning Organization
MS/ETMCC – Message Sets for External Traffic Management Center Communications
MTP – Metropolitan Transportation Plan
MUTCD – Manual on Uniform Traffic Control Devices
NHTSA – National Highway Traffic Safety Administration
NORPC – New Orleans Regional Planning Commission
NTCIP – National Transportation Communications for Intelligent Transportation System
PRISM – Performance and Registration Information Systems Management
O & M – Operations and Maintenance
OEM – Original Equipment Manufacturer
OHSEP – Office of Homeland Security and Emergency Preparedness
OPAC – Optimized Policies for Adaptive Control
PCMS – Portable Changeable Message Signs
PDA – Personal Digital Assistant
RHODES – Real-time Hierarchical Optimized Distributed Effective System
RR – Roles and Responsibilities
RSE – Roadside Equipment
RTMC – Regional Traffic Management Center
RWIS – Road Weather Information System
SAE – Society of Automotive Engineers
SCATS – Sydney Coordinated Adaptive Traffic System
SCOOT – Split Cycle Offset Optimization Technique
SCP – Signal Control and Prioritization
SDO – Standards Development Organizations
SSL – Signal System Local
SSM – Signal System Master
TDM – Travel Demand Management
TIM – Traffic Incident Management
TIP – Transportation Improvement Program
TMA – Transportation Management Area
TMC – Traffic Management Center (a.k.a. Transportation Management Center)
TMDD – Traffic Management Data Dictionary
TMP – Transportation Management Plan
USDOT – United States Department of Transportation
TSS – Transportation Sensor Systems
UAS – Unmanned Aerial Systems
UAV – Unmanned Aerial Vehicles
V2D – Vehicle-To-Device
V2I – Vehicle-To-Infrastructure
V2V – Vehicle-To-Vehicle



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VD – Vehicle Detection
VDMS – Video Distribution Management System
VDS – Video Distribution System
VHT – Vehicle Hours Traveled
VII – Vehicle Infrastructure Integration
VMT – Vehicle Miles Traveled
WIM – Weigh-in-Motion
XML – Extensive Markup Language



1.0 INTRODUCTION

The Louisiana Statewide Intelligent Transportation Systems (ITS) Architecture is a roadmap for transportation systems integration using advanced technology to monitor, manage and optimize operations and safety. Furthermore, there is a federal requirement in place for any entity that that wants to use federal funds for the deployment of ITS to have a regional ITS architecture in place to demonstrate that there has been a coordinated consensus building process to determine how needs will be met and how systems will be integrated. Federal Highway Administration (FHWA) Final Rule 940 Part 11 Paragraph 940.9 (a) states that:

“A regional ITS architecture shall be developed to guide the development of ITS projects and programs and be consistent with ITS strategies and projects contained in applicable transportation plans. The National ITS Architecture shall be used as a resource in the development of the regional ITS architecture. The regional ITS architecture shall be on a scale commensurate with the scope of ITS investment in the region. Provision should be made to include participation from the following agencies, as appropriate, in the development of the regional ITS architecture: Highway agencies; public safety agencies (e.g., police, fire, emergency/medical); transit operators; Federal lands agencies; State motor carrier agencies; and other operating agencies necessary to fully address regional ITS integration.”

The architecture provides an overarching framework that spans the region's transportation assets and interactions. It was developed through a cooperative effort by the region's transportation agencies, covering different modes and roads in the region. In addition, it represents a shared vision of how each agency's systems will work together, sharing information and resources to provide a safer, more efficient, and more effective transportation system for travelers in the region. Therefore, The Architecture provides a summary of the existing system and services, gaps in services and proposed transportation services based on existing or emerging needs. The Architecture also provides various views of technology-based services or Service Packages that can be viewed as an element of the overall transportation system, providing visibility into the relationship between individual transportation projects and ways to cost-effectively build an integrated transportation system over time.

The vision for the Louisiana Department of Transportation and Development (LADOTD) Statewide ITS Architecture is to develop a transportation system that maximizes the safety and capacity of existing transportation systems to mobility and safety for all users using advanced technology.

- Traveler delays on freeways and major arterials will be minimized through congestion mitigation such as rapid incident detection, response and clearance of all incidents, and pre-trip and en-route traveler information.
- Residents in the State especially on the coastline can be evacuated safely and rapidly during emergencies such as hurricane with continuous monitoring of traffic and public information from impact zone to safe areas for evacuees.
- Travelers within the state can make better transportation related decisions about trip need, time, route and mode based on reliable real-time information about current and forecasted traffic conditions.
- Travelers can expect a safe transportation system with advance warning systems to warn travelers of any impending danger such as weather (fog, ice, snow, wind, flooding, etc), connected vehicle (vehicle-to-vehicle, vehicle-to-infrastructure, and vehicle-to-anything)



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Introduction

- Use advance technology in traffic control and communications to enhance efficiency of the road network in Louisiana to reduce delays and stimulate economic growth and improve livability.

While this Statewide ITS Architecture (Architecture) will continue to leverage proven technologies to solve mobility, safety and communications issues identified in the State of Louisiana (State), there are also nascent technologies such as connected vehicles, automated vehicles, and advanced air mobility (AAM) systems that show promise to enhance mobility and safety and even revolutionize transportation and services. It in the light of such this promise that the US Department of Transportation (USDOT) has put out a bold plan¹ to accelerate Vehicle-to-Everything (V2X) deployments and has set ambitious targets for infrastructure development to support the connected vehicle ecosystem and unlock the benefits envision. While there has been significant progress in the autonomous vehicle development it appears, there are still significant technical developments required to ensure safe operations in a highly dynamic roadway environment. While extensive deployment may still be years in the future, it appears that the progressive developments of constituent autonomous vehicle capabilities will continuously be deployed in new vehicles. Modern vehicles have some features such as lane keeping, emergency braking, etc. technologies that are becoming standard. The general trend expected would be progression from partial automation, conditional driving automation, high driving automation and finally full driving automation. The success of autonomous vehicle operations could be significantly enhanced with complementary technology that is deployed by infrastructure owners and operators (IOO).

The purpose of this Architecture is to provide guidance to help the Department of Transportation and Development (DOTD) better position itself to continue to leverage emerging technologies to better serve its constituents. The 2022 Louisiana Traffic Records Summary Report² showed that 852 fatal crashes occurred on the roadways resulting in 906 fatalities, over 42,000 injury crashes occurred that let to over 68,000 injury crashes, and over 105,000 property damage only crashes. Several proven safety countermeasures include ITS systems that can help curb this epidemic on the roadways in Louisiana.

These novel technologies also come with inherent risks both known and unknown. One of the risks typically cited is if IOO used limited public funds to invest in upgrading their infrastructure to support connected and autonomous vehicles (CAV) and vehicle manufacturers – original equipment manufacturers (OEMs) decided to discontinue the technology in their vehicle. There are potential equity concerns to be addressed so that no particular group is disadvantaged both spatially and temporally.

This document will also attempt to provide some insights on issues and help provide guidance that can steer the investments in ITS that will prove beneficial to the public.

¹ Saving Lives with Connectivity: A Plan to Accelerate V2X Deployment. (October 2023) U.S. Department of Transportation

²

https://carts.lsu.edu/admin/uploads/Louisiana_Traffic_Records_Summary_Report_2022_a49ae6e9be.pdf
(Accessed 2/21/2024)



2.0 ARCHITECTURE SCOPE

2.1 BACKGROUND

The State of Louisiana is located in the southern region of the United States and bordered by Texas to the west, Arkansas to the north, Mississippi to the east, and the Gulf of Mexico to the south. The population estimates for July 2023 according to the Census Bureau³ is 4,573, 749. The population of the State of Louisiana in 2030 is projected to be in the range of 5,161,800 to 8,813,420.

The Bureau of Transportation Statistics (BTS) reported that the transportation assets in Louisiana include 61,416 miles of public road, 12,899 bridges and 2,940 miles of freight railroad, 9 major airports, 2,820 miles of waterway and 11 major ports are in Louisiana⁴. In 2018 there were about 3.4 million licensed drivers, 32.4 million transit riders and 7.8 million air carrier enplanements. Of the 1.9 million people employed in the State, the following are the distributions of the modes of transport to work: 82.7% drive alone to work, 9% carpool, 1.2% use public transportation, 0.5% use bicycles, 1.8% walk, 1.4% used taxis, motorcycle or other, and 3.4% worked from home.

Data provided by the Center for Analytics and Research in Transportation Safety (CARTS)⁵ shows that in the year 2022 alone, 852 fatal crashes occurred on the roadways in Louisiana which resulted in 906 fatalities, 42.4 thousand injury crashes led to 68 thousand injuries, and about 105.3 thousand property-damage-only (PDO) crashes.

2.2 GEOGRAPHIC SCOPE

The geographic scope for deployment of the Statewide ITS Architecture is defined as follows: the Architecture will cover all interstate roadways, US highways and State Routes that serve as corridors to bridge the Metropolitan Planning Organizations (MPOs) outside of the MPO boundaries. Currently there are regional ITS architectures that have been developed and maintained for all MPOs in the State and these are:

1. Alexandria - Rapides Area Planning Commission (RAPC)
2. Baton Rouge – Capital Region Planning Commission (CRPC)
3. Houma-Thibodaux – Terrebonne Parish Consolidated Government

³ <https://www.census.gov/quickfacts/LA> (Accessed 2/23/2024)

⁴ <https://www.bts.gov/sites/bts.dot.gov/files/states2020/Louisiana.pdf> (Accessed 2/29/2024)

⁵ https://carts.lsu.edu/admin/uploads/2022_Data_Report_1a832ed02e.pdf (Accessed 2/29/2024)



4. Lafayette – Acadiana Metropolitan Planning Organization (AMPO)
5. Lake Charles – Imperial Calcasieu Regional Planning and Development (IMCAL)
6. Monroe – North Delta Regional Planning Commission (NDRPC)
7. New Orleans – Regional Planning Commission (RPC)
8. Northshore – South Tangipahoa Metropolitan Planning Organization (STMPO)
9. Shreveport-Bossier City – Northwest Louisiana Council of Governments (NLCOG)

Figure 1 was developed by the Bureau of Transportation Statistics⁶ and shows the highway network for Louisiana and **Figure 1** shows the corridors where deployment of ITS services will be focused.

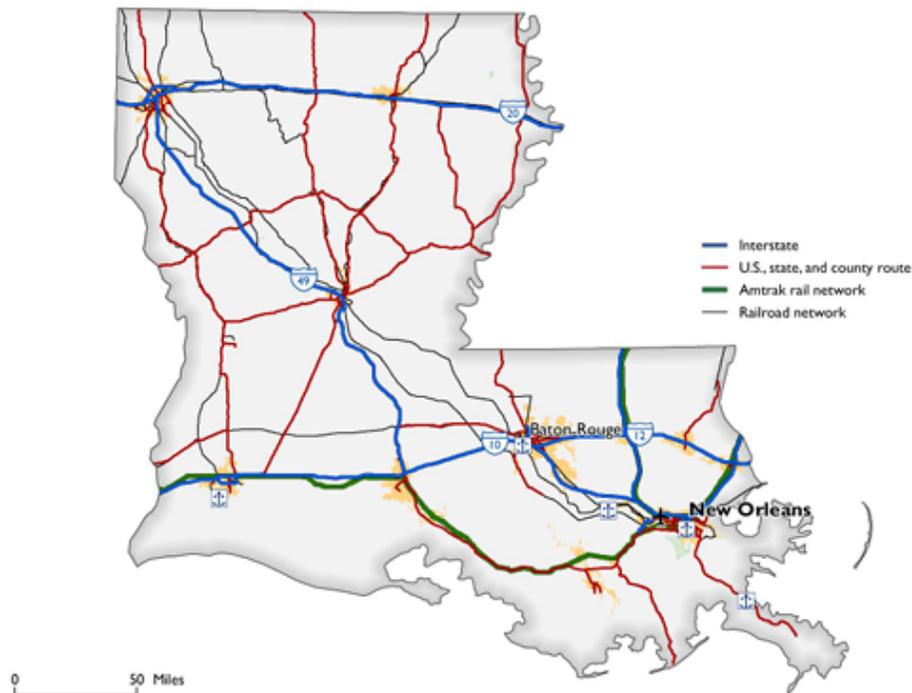


Figure 1: Louisiana Highway Network

⁶ <https://www.bts.gov/sites/bts.dot.gov/files/states2020/Louisiana.pdf> (Accessed 2/23/2024)



Table 2-1: Principal Highways in Louisiana

Interstates	United States (U.S.) Routes	
Interstate 10	U. S. Route 11	U. S. Route 190
Interstate 12	U. S. Route 51	U. S. Route 371
Interstate 20	U. S. Route 61	U. S. Route 425
Interstate 49	U. S. Route 63	
Interstate 55	U. S. Route 65	
Interstate 59	U. S. Route 71	
Interstate 110	U. S. Route 79	
Interstate 210	U. S. Route 80	
Interstate 220	U. S. Route 84	
Interstate 310	U. S. Route 90	
Interstate 510	U. S. Route 165	
Interstate 610	U. S. Route 167	
Interstate 910 ⁷	U. S. Route 171	

⁷ The New Orleans Westbank Expressway (US 90B) was designated by AASHTO in 1990 to be I-910. However, it was never signed because of the future I-49. To date, its signing as I-910 is still on hold.



2.3 ITS SERVICE SCOPE

The Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT) will serve as the framework for the development of the Statewide ITS Architecture. ARC-IT⁸ provides a “common framework for planning, defining, and integrating intelligent transportation systems.” ARC-IT implements the National ITS Reference Architecture which includes Enterprise, Functional, Physical and Communications views. There are several Service Packages which define services desired to implement a portion of the National ITS architecture. A Service Package is made up of different physical objects and their functional objects and the required information exchanges between systems to provide a desired service. Currently there are 150 Service Packages defined in ARC-IT and grouped into the following areas:

1. Commercial Vehicle Operations
2. Data Management
3. Maintenance and Construction
4. Parking Management
5. Public Safety
6. Public Transportation
7. Sustainable Travel
8. Support
9. Traveler Information and Personal Mobility
10. Traffic Management
11. Vehicle Safety
12. Weather

The ITS services provided will be driven by the needs for mobility, safety and communications based on assessments in corridors bridging the MPOs. Furthermore, the Statewide ITS architecture will identify other services desired to enhance transportation services in the State. There are corridors that experience persistent recurring congestion and high incidents that impact travel time reliability. Louisiana has hurricane contingency and many chemical plants that may necessitate evacuation. Stakeholders such as the Governor’s Office for Homeland Security and Emergency Preparedness (GOHSEP) desire situational awareness of evacuation routes with real-time traffic information, monitoring capability, traveler information and traffic control in order to make both strategic and tactical decisions to evacuate affected residents to

⁸ <https://www.arc-it.net/> (Accessed 2/26/2024)



LOUISIANA STATEWIDE INTELLIGENT TRANSPORTATION SYSTEMS ARCHITECTURE

Architecture Scope

safety. While not all Service Packages will be deployed at this time, the service packages will be the basis for identifying some of the transportation challenges (existing or emerging), needs associated with the services and stakeholders that participate to provide the services.

2.4 TIME FRAME

The time frame proposed for the Statewide ITS Architecture is 5 years. Prior architectures have been developed for a 10-year horizon. Even though DOTD typically is unable to implement all ITS services desired during this period, shortening the planning period to 5 years is important due to the rapid developments in technology that impact transportation. The 5-year horizon will allow comprehensive refresh of the Statewide ITS architecture to keep it current and relevant to Louisiana's needs. It is also proposed that the document undergo periodic reviews during this period to revise programs and proposed projects to address evolving user needs and better leverage state-of-the-art technology to meet those needs in the State.

2.5 MAINTAINER

The Louisiana Department of Transportation and Development (LADOTD) will maintain the Statewide ITS Architecture (Architecture). Section 13.0 provides details on how the Architecture will be maintained over time to ensure timely updates are made to leverage technological advancements for transportation operations, safety and enhance the environment.



3.0 RELATIONSHIP TO PLANNING

The Statewide ITS Architecture serves as one of the bonafide transportation documents in the state with the express purpose of deploying intelligent transportation systems to enhance mobility, safety and the environment. The Architecture is an integral part of planning for the operations and maintenance strategies that are addressed by the regional transportation planning process. The Architecture provides a framework that connects operations and maintenance objectives and strategies with the integrated transportation system improvements that are implemented as a progressive series of ITS projects. The Architecture also is used to define the data needs associated with performance monitoring that supports an informed planning process.

Several State Planning documents such as the Long-Range Transportation Plan (LRTP), Freight Plan, or the Metropolitan Transportation Plans typically have solutions that include ITS deployment. The United States Department of Transportation (USDOT) also puts out several policy documents that guides transportation and ITS deployment. An integral part of transportation systems management and operations (TSMO) includes the use of ITS. DOTD's TSMO plan is currently under development. The Statewide ITS Architecture harmonizes and provides details of desired ITS services in the State. This Section identifies the planning objectives, strategies, and associated performance measures from the regional plan. These planning elements are connected with ITS services in the Regional Architecture Development for Intelligent Transportation (RAD-IT) database.

3.1 STATEWIDE TRANSPORTATION PLAN

The Statewide Transportation Plan recognizes the importance of ITS in improving operational efficiencies in the existing transportation infrastructure. As there are more demands on the limited funding available, DOTD and other agencies have to find ways to provide safety and efficient transportation system to support growth of the state but at a reasonable cost. Intelligent transportation systems has been recognized as one of the tools that can be leverage to deliver operational improvements at moderate cost. The ITS systems advanced for consideration in this document include the following: full integration of system, legislation involving operational changes, tolling, and commitment to system operations, signal operations and coordination emergency services.

3.2 LOUISIANA FREIGHT PLAN

The Louisiana Freight Plan is currently being updated. There are currently 19 freight railroads in Louisiana and 3 Amtrak passenger routes. There are 3600 miles of rail operated in the state and 6 Class I railroads. Annually about 121 million tons of freight are handled by rail. Rail freight movement in Louisiana can be



Relationship To Planning

broken down as follows⁹: 47% transits through, 30% terminates and 23% originates. Trucking also plays a key role in freight movement in the State. There are about 13 weigh stations for axle load enforcement, safety, taxing and credentials management. There are 11 rest areas where trucks have access. Trucking accounts for 58% of tonnage moved and about 46% of freight value moved in the state (excluding pipeline movement)¹⁰.

3.3 STRATEGIC HIGHWAY SAFETY PLAN

The Strategic Highway Safety Plan (SHSP)¹¹ is a strategic plan to improve highway safety within the State by using a data driven approach to identify risk factors to help mitigate crashes especially fatal and injury related crashes. This plan establishes emphasis areas with targets for safety improvement to move closer to the “Destination Zero Deaths” goals. The primary goal for the SHSP is to continue to reduce fatalities and serious injuries by 50% in the year 2030. There are other safety related plans that help drive the plan to achieve this and they include the Louisiana Highway Safety Plan and Highway Safety Improvement Plan. The plan calls for the use of ITS such as “dynamic warning signs and other ITS technologies to reduce lane departure at locations with sustained crash pattern.”

3.4 TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS PLAN

Transportation Systems Management and Operations (TSMO) seeks to operate roadways in a manner that preserves and manages the capacity of transportation asset to improve mobility and safety. It addresses this need using all modes of transportation available. Traditionally, safety and congestion issues have been addressed using capacity improvements such as widening roadways. As several constraints such as funding, physical and environment come into play such capacity improvements become less feasible. There are several proven TSMO strategies and concepts used by many agencies. TSMO strategies that fall under the ITS umbrella include ramp metering, speed management, special and planned event management, traffic incident management, truck parking management, tolling and congestion pricing. DOTD is in the process of developing a TSMO plan even though several of the proven TSMO strategies have been used and continue to be used in the State for mobility and safety improvements. Table 3-1 highlights DOTD’s objectives for implementing its TSMO plan.

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http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Marine_Rail/Pictures/web%20Rail%20Graphic%206.png (Accessed 2/29/2024)

10

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Transportation_Plan/2015_Statewide_Transportation_Plan/04_Transportation%20in%20Louisiana.pdf (Accessed 2/29/2024)

¹¹ <https://destinationzerodeaths.com/Images/Site%20Images/ActionPlans/SHSP.pdf> (Accessed 2/29/2024)



LOUISIANA STATEWIDE INTELLIGENT TRANSPORTATION SYSTEMS ARCHITECTURE

Relationship To Planning

Table 3-1 – Planning Objectives

Number	Type	Name	Description	PM Category	Performance Measure
1	Objective	Improved Transportation Network Safety	Continually improve the safety of the statewide transportation system for all users, and reduce the number of crashes and other incidents associated with work zone and high accident location areas.	Crashes	Crashes/MVM
				Incident Clearance Time	Time
2	Objective	Improved Traffic Management	Reduce recurring and non-recurring delay for travelers in the State. Generally the goal is to reduce travel time variability.	Delay	Vehicle Hours of Travel (VHT)
3	Objective	Reduced Non-Recurring Congestion	To minimize the effects of unexpected crashes or incidents, bad weather, construction and irregular congestion causes. Major traveler delays on freeways and major arterial routes will be minimized through rapid detection, response, and clearance of all reported incidents.	Travel Time Reliability	Planning Time Index, Buffer Time Index
4	Objective	Effective Dissemination of Traffic Information	Increase the number of people receiving accurate traveler information.	Delay	Vehicle Hours of Travel (VHT)
5	Objective	Improved Emergency Management	Citizens will be able to reach safe locations during emergency evacuations sooner through the continuous monitoring and management of traffic and communication of best route information to evacuees.	Delay	Vehicle Hours of Travel (VHT)
6	Objective	More Efficient Modal Utilization	Increase the number of people receiving transit schedule information.	Modal Connectivity	Connectivity, Wait Time
7	Objective	Improved Administrative Efficiency, Operational Safety, and Productivity for Commercial Vehicles	Decrease state resources expended on routine administrative tasks, increase revenues as a result of improved compliance, reduce motor carrier regulatory compliance cost, reduce commercial vehicle crash rate and cost effectiveness of inspections through better targeting of unsafe and illegal carriers.	Freight Travel Time	Hours
8	Objective	Amber Alert	Amber Alerts are issued to alert the general public of a child abduction. Amber Alerts are issued via radio, TV, email, SMS Text and DMS.	Delay	Minutes



4.0 ITS STAKEHOLDERS

Identifying stakeholders is an important task in ITS architecture development since effective ITS involves the integration of multiple stakeholders and their transportation systems. This section describes the stakeholders who either participated in the creation of the Louisiana Statewide ITS Architecture or whom the participating stakeholders felt were needed to be included in the architecture. Some stakeholders have been grouped in order to better reflect mutual participation or involvement in transportation services and elements. Every stakeholder listed in Table 4-1 is related to one or more of the transportation inventory elements described in the next chapter, either as an individual stakeholder or as a member of a stakeholder group.

Table 4-1 – ITS Stakeholders

Stakeholder Name	Stakeholder Description
Airports	This represents the various airports in the state which are multimodal facilities. There are several airports that serve domestic as well as international flights. New Orleans airport is the only international airport in the state.
Archived Data Users	Represents users of archived data.
Communications Providers	This stakeholder group refers to all telecommunications providers including both fiber and wireless networks.
CVO	Commercial vehicle operators represents trucking companies in the state that move freight throughout the state.
Department of Public Safety	The Department of Public Safety (DPS) provides safety services to both the citizens of the state and visitors to the state of Louisiana by upholding and enforcing the laws, administering regulatory programs, managing records, educating the public and managing emergencies, both directly and through interaction with other agencies.
DEQ	The Department's mission is to provide service to the people of Louisiana through comprehensive environmental protection in order to promote and protect health, safety and welfare while considering sound policies regarding employment and economic development.
DOTD Contractor	
Electric Utilities	There are several electric utility companies that operate in Louisiana. These include Entergy, DEMCO, SLEMCO, CLECO, SWEPSCO, LUS. These companies generate and distribute power to many homes, industries and institutions. The availability of requisite load and transformer requirements that meet charging demand for electric vehicles will impact deployment of electric vehicle charging stations.
Emergency Medical Services	This includes local hospitals and emergency medical service providers (i.e., ambulance, air- evacuation, etc) that are components of emergency management.
Financial Institutions	These are financial institutions that support electronic payment.
GNOEC	The Greater New Orleans Expressway Commission, also known as the Causeway Commission, operates a 26-mile bridge across lake Pontchartrain. The Causeway commission functions independently of other regional traffic agency operations. The bridge has some ITS devices deployed.
GOHSEP	Governors Office for Homeland Security and Emergency Preparedness (GOHSEP) is responsible for public safety and security from emergencies and disasters. GOHSEP coordinates State Disaster Declarations authorized by the Governor. The disasters include but are not limited to terrorism, hazardous materials, flooding and hurricanes.



LOUISIANA STATEWIDE INTELLIGENT TRANSPORTATION SYSTEMS ARCHITECTURE

ITS Stakeholders

Stakeholder Name	Stakeholder Description
Gulf Intracoastal Waterway	The Gulf Intracoastal Waterway (GIWW) is a significant navigable inland waterway that runs along the Gulf Coast of the United States from Florida to Texas. The GIWW spans approximately 1,300 miles (2,100 kilometers) from Saint Marks, Florida, to Brownsville, Texas. It primarily serves as a channel for barge transportation with a depth of about 12 feet. The GIWW intersects or meets several other navigable rivers and waterways, including the Mississippi River, Mobile Bay, and the Sabine-Neches Waterway, among others. Many of the busiest ports in the United States, in terms of cargo tonnage, are located on or near the Gulf Intracoastal Waterway. Notable ports include Mobile, Alabama, New Orleans, Louisiana, and Galveston Bay, Texas. The Gulf Intracoastal Waterway plays a crucial role in facilitating maritime transportation and commerce along the Gulf Coast
LADOTD	Louisiana Department of Transportation and Development (LADOTD) is an arm of the Louisiana government responsible for state-wide transportation. The LADOTD responsibilities include statewide transportation system operations. This stakeholder group includes all Department of Transportation and Development (DOTD) units (ITS, Office of Planning Programming, Highway Safety, Weights and Standards, Traffic Services, and Traffic Engineering) involved in transportation planning, operations, and maintenance. Some of the typical responsibilities include incident detection and response, evacuation planning and management, transportation data collection, management, and distribution for the local region as well as for the entire state.
LADOTD/GNOEC	This stakeholder group manage tolling facilities (LA 1 and Causeway)
Local DPW	Represents the local public works departments responsible for the maintenance of roadways and ITS field equipment.
Louisiana Department of Motor Vehicle	Department of Motor Vehicles is the agency responsible for motor vehicle licensing and registration.
Louisiana Motor Transport Association	LMTA represents the motor carrier operations industry in Louisiana. It includes both regulated and exempt, intrastate and interstate motor carrier operations
Louisiana State Police	Louisiana State Police (LSP) agency is responsible for operating Louisiana State Police Centers. This includes Computer Aided Dispatch database, which collects incident/emergency detection, dispatch, response, and status information related to the Louisiana State Police officers/equipment. They are also responsible for Louisiana State Police vehicles. LSP has nine (9) Troop Districts and has specialized training in emergency operations.
LTRC	The Louisiana Transportation Research Center (LTRC) conducts short-term and long-term research and provides technology assistance, engineering training and continuing education, technology transfer, and problem-solving services to DOTD and others in the transportation community.
Media	This stakeholder group includes local TV/Radio Channels and print media that are responsible for receiving and distributing transportation information like traffic conditions, incidents and road weather conditions.
MPO Group	This refers to all the metropolitan planning organizations (MPO) existing in the State of Louisiana. An MPO is federally mandated and federally funded transportation policy making organizations that are made up of representatives from local government and government transportation authorities. MPOs coordinate with LADOTD for regional ITS deployments.
NOAA - National Oceanic and Atmospheric Administration	National Oceanic and Atmospheric Administration. Includes the National Weather Service and the National Hurricane Center.
Planning Organizations	This refers to planning organizations that fall outside of the established MPOs in the State of Louisiana. This stakeholder group represents all planning organizations within parishes and towns that fall outside the MPOs.
Ports	This Stakeholder represents the Ports which are transfer points or multimodal facilities
Public	Members of the general public own and operate various devices/systems to access ITS information, including PDAs, cell phones, and personal computers.
Public Transit Providers	The Public Transit Providers includes all modes of transit (bus, rail, ferry, etc) responsible for establishing, financing, and sustaining effective public transit service in both urban and rural areas.
Railroads	The Association of American Railroads (AAR) lists 19 common-carrier freight railroads in Louisiana – six Class-1 railroads and 13 Short Line or Switching and Terminal Railroads. These railroads own 2,940 route miles of main line track in the state and operate on an additional 619 miles of trackage rights. Additionally, Amtrak runs three long-distance trains in Louisiana that operate on track owned by the Class-1 railroads. Louisiana ranks 17th in the nation in the number of railroads and 23rd in the nation in the miles of track. Louisiana sits firmly as an average railroading state.



LOUISIANA STATEWIDE INTELLIGENT TRANSPORTATION SYSTEMS ARCHITECTURE

ITS Stakeholders

Stakeholder Name	Stakeholder Description
Regional Event Promoters	This refers to private entities that promote concerts, sporting events and other activities that significantly impact highway travel in the state.
Tourism and Traveler Information Service Providers	This includes various tourism agencies, chambers of commerce, hotel associations, motorist services, and map search.



5.0 ITS INVENTORY AND SERVICES

5.1 OPERATIONAL REGIMES

Louisiana is prone to hurricane emergencies because of its proximity to the Gulf of Mexico. Other natural emergencies include ice, fog and flooding. There are also many industrial plants and refineries that pose hazards related to fires, explosions and chemical leaks. Other potential disasters may be artificially induced such as terrorism. The Statewide ITS architecture is required to meet these diverse operational challenges and help deliver an efficient transportation system to meet the mobility demands for extreme events or the daily socio-economic activities.

Three distinct operational regimes have been identified and these are normal, major incident and emergency operations. Each stakeholder has operational roles and responsibilities based on the range of services required to achieve the desired objectives in each scenario. The stakeholder roles and responsibilities will be defined for the various operational regimes. The key differences in the three operational regimes (normal, major incident and emergency operations) are the scale and urgency of resource allocation to alleviate congestion, manage incidents, and the lead agency responsible for operations.

5.1.1 Normal Operation

The Normal Operation regime describes normal traffic conditions and the predominant concern is recurring traffic during rush hour. Occasionally, minor incidents may happen which may cause additional delays because of reduced lane capacity, however the roadway remains passable. The agency with primary operational responsibility is DOTD with support from LSP or Local Public Safety Agencies.

5.1.2 Major Incident

The Major Incident regime describes a scenario where there is major incident or public event which requires extended closure of roadway. Examples of major incidents include chemical spills, bridge collapse, flooding, or a major sporting event. The impacts of a major incident extend over a wider geographic area than minor incidents that occur under “normal operation.” The agency with primary operational responsibility will be LSP with support from DOTD and other Local Public Safety Agencies.

5.1.3 Emergency Operation

Emergency operation is typically activated by GOHSEP and involves major events such as hurricane hazard or other public safety related issue that mandates massive evacuation. This operational regime has system-wide impacts on the transportation network. GOHSEP will determine the emergency action level which in turn defines operational responses from DOTD and LSP. DOTD will designate evacuation routes and be responsible for road network status monitoring and information communication to support



evacuations. LSP will be responsible for diversions, traffic control and incident management. The agency with primary operational responsibility is GOHSEP.

5.2 ITS ASSETS

DOTD has deployed several ITS devices, communications infrastructure, and traffic management centers to deliver various ITS services. The ITS deployments have enable many services such as traffic monitoring, congestion management, incident management, traveler information, weather , emergency and evacuation management. There are other assets such as weigh-in-motion systems (WIMS) and PrePass Automated Vehicle Identification (AVI) for commercial vehicle operations. The weigh stations are managed by the Department of Public Safety. Table 5-1 provides a summary of the ITS devices deployed to date. DOTD ITS Section continues to deploy devices and as new projects are completed and commissioned the device counts will change.

Table 5-1 – DOTD Device Inventory

Device Type	Quantity
CCTV Camera	457
DMS	105
TTMS	1
Ramp Meters	24
VDS	11490
Flashing Beacons	3
Water Level (ZETRON)	Not directly managed by ATMS
Motorist Assistance Patrol	Not directly managed by ATMS

5.2.1 Traffic Management Centers

DOTD has 5 traffic management centers (TMCs) currently in operation to address regional traffic management needs in Baton Rouge, New Orleans, Houma, Lake Charles and Shreveport. There is also a Statewide TMC located in Baton Rouge to manage traffic outside of the regions identified. The Statewide TMC also manages traffic in any region when the TMCs are closed or after hours. Figure 2 shows the locations of the regional and Statewide TMCs. Table 5-1 provides the counts for the various devices monitored and operated by DOTD.



LOUISIANA STATEWIDE INTELLIGENT TRANSPORTATION SYSTEMS ARCHITECTURE

ITS Inventory and Services



Figure 2: TMC Location Map

5.3 ITS ARCHITECTURE INVENTORY

An inventory of existing and planned transportation systems is the basis for the Louisiana Statewide ITS Architecture. The transportation system inventory was developed based on input from stakeholders. The inventory includes a list of ITS elements and the associated stakeholder responsible for system operation. This section describes the inventory of transportation elements for the region. A transportation element can be either a center, support, vehicle, traveler or field equipment. Each transportation element listed below has one or more stakeholders associated with it. In order to reduce the complexity of the architecture, some transportation elements with similar functionalities may be grouped together. Each transportation inventory element is mapped to at least one ARC-IT physical object. In addition, physical standards may be identified that define the form, fit, and function of individual ITS elements to enable interchangeability, vendor independence, and future interconnections.



LOUISIANA STATEWIDE INTELLIGENT TRANSPORTATION SYSTEMS ARCHITECTURE

ITS Inventory and Services

Table 5-2 – ITS Inventory

Element Name	Element Description	Stakeholder	Element Status
Airports	Louisiana has several airports for public use with a major international airport in New Orleans.	Airports	Existing
Commercial Vehicles	This represents motor carriers equipped with on-board communications to communicate with infrastructure on or near the roadway. Such infrastructure may include CVISN and PRISM.	CVO	Existing
CVO Inspection Stations	This represents commercial vehicle inspection stations operated within the state to check credentials of commercial vehicle operations and axle weight enforcement.	Louisiana State Police	Existing
CVO Inspection Stations	This represents commercial vehicle inspection stations operated within the state to check credentials of commercial vehicle operations and axle weight enforcement.	Louisiana State Police	Existing
CVO Inspection Stations	This represents commercial vehicle inspection stations operated within the state to check credentials of commercial vehicle operations and axle weight enforcement.	Louisiana State Police	Existing
DEQ	DEQ is responsible for environmental conservation and has the mandate to protect and enhance environment and natural resources	DEQ	Existing
Emergency 911 Centers	This element represents the emergency response operations including fire, police, 911, and any other emergency response operators. This element is responsible for the emergency response operations and management within its jurisdiction	Department of Public Safety	Existing
Emergency Services Functions	There are 16 ESF entities that can be activated during an emergency to use their resources for emergency operations.	GOHSEP	Existing
GNOEC/LADOTD	Responsible for financial transactions for fare/toll payment	LADOTD/GNOEC	Existing
GOHSEP	GOHSEP represents the Governor's Office for Homeland Security and Emergency Preparedness and is responsible for emergency response to major disaster in Louisiana.	GOHSEP	Existing
GOHSEP	GOHSEP represents the Governor's Office for Homeland Security and Emergency Preparedness and is responsible for emergency response to major disaster in Louisiana.	GOHSEP	Existing
ITS Field Equipment	This element includes the equipment distributed on and along the roadway that monitors and controls traffic and monitors and manages the roadway itself. Equipment includes traffic signals, traffic detectors, environmental sensors, highway advisory radios, dynamic message signs, CCTV cameras and video image processing systems, and grade crossing warning systems.	LADOTD	Existing
ITS Field Equipment	This element includes the equipment distributed on and along the roadway that monitors and controls traffic and monitors and manages the roadway itself. Equipment includes traffic signals, traffic detectors, environmental sensors, highway advisory radios, dynamic message signs, CCTV cameras and video image processing systems, and grade crossing warning systems.	LADOTD	Existing
ITS Field Equipment	This element includes the equipment distributed on and along the roadway that monitors and controls traffic and monitors and manages the roadway itself. Equipment includes traffic signals, traffic detectors, environmental sensors, highway advisory radios, dynamic message signs, CCTV cameras and video image processing systems, and grade crossing warning systems.	LADOTD	Existing
ITS Field Equipment	This element includes the equipment distributed on and along the roadway that monitors and controls traffic and monitors and manages the roadway itself. Equipment includes traffic signals, traffic detectors, environmental sensors, highway advisory radios, dynamic message signs, CCTV cameras and video image processing systems, and grade crossing warning systems.	LADOTD	Existing



LOUISIANA STATEWIDE INTELLIGENT TRANSPORTATION SYSTEMS ARCHITECTURE

ITS Inventory and Services

Element Name	Element Description	Stakeholder	Element Status
ITS Field Equipment	This element includes the equipment distributed on and along the roadway that monitors and controls traffic and monitors and manages the roadway itself. Equipment includes traffic signals, traffic detectors, environmental sensors, highway advisory radios, dynamic message signs, CCTV cameras and video image processing systems, and grade crossing warning systems.	LADOTD	Existing
ITS Field Equipment	This element includes the equipment distributed on and along the roadway that monitors and controls traffic and monitors and manages the roadway itself. Equipment includes traffic signals, traffic detectors, environmental sensors, highway advisory radios, dynamic message signs, CCTV cameras and video image processing systems, and grade crossing warning systems.	LADOTD	Existing
ITS Field Equipment	This element includes the equipment distributed on and along the roadway that monitors and controls traffic and monitors and manages the roadway itself. Equipment includes traffic signals, traffic detectors, environmental sensors, highway advisory radios, dynamic message signs, CCTV cameras and video image processing systems, and grade crossing warning systems.	LADOTD	Existing
LADOTD District Traffic Operations	This element represents traffic operations or traffic engineering within the district office that is responsible for traffic management activities within its jurisdiction. The typical activities include traffic monitoring, traffic data collection, traffic signal operations, and other traffic management related activities. This also includes communicating with Traffic Management Center (TMCs) and other departments like maintenance for roadway maintenance activities.	LADOTD	Existing
LADOTD Flood Warning Systems	The flood warning system consists of water level monitoring equipment on roads at locations that are susceptible to flooding including underpasses, tunnels and low lying roadways.	LADOTD	Existing
LADOTD Flood Warning Systems	The flood warning system consists of water level monitoring equipment on roads at locations that are susceptible to flooding including underpasses, tunnels and low lying roadways.	LADOTD	Existing
LADOTD Flood Warning Systems	The flood warning system consists of water level monitoring equipment on roads at locations that are susceptible to flooding including underpasses, tunnels and low lying roadways.	LADOTD	Existing
LADOTD ITS Section 56	This element represents ITS Section (Section 56) under the LADOTD. The ITS section is responsible for statewide operations center located in DOTD headquarters. Also, the ITS section is responsible for management information system for transportation, statewide ITS elements operations, and maintenance. The ITS section is also responsible for maintenance of all ITS equipment in the state.	LADOTD	Existing
Local DPW	This refers to the local public works departments responsible for the maintenance of roadways and field equipment	Local DPW	Existing
Local Planning Organizations	This refers to all the planning organizations existing outside of the established metropolitan planning organizations in the State of Louisiana.	Planning Organizations	Existing
Local Public Safety Agencies	Local Public Safety Agencies represents the local public safety providers. This includes local law enforcement providers, fire services and emergency responders and 911 call centers.	Department of Public Safety	Existing
LSP	Louisiana State Police (LSP) agency is responsible for operating Louisiana State Police Centers. This includes Computer Aided Dispatch database, which collects incident/emergency detection, dispatch, response, and status information related to the Louisiana State Police officers/equipment. They are also responsible for Louisiana State Police vehicles. LSP has nine (9) Troop Districts and has specialized training in emergency operations.	Louisiana State Police	Existing



LOUISIANA STATEWIDE INTELLIGENT TRANSPORTATION SYSTEMS ARCHITECTURE

ITS Inventory and Services

Element Name	Element Description	Stakeholder	Element Status
LSP	Louisiana State Police (LSP) agency is responsible for operating Louisiana State Police Centers. This includes Computer Aided Dispatch database, which collects incident/emergency detection, dispatch, response, and status information related to the Louisiana State Police officers/equipment. They are also responsible for Louisiana State Police vehicles. LSP has nine (9) Troop Districts and has specialized training in emergency operations.	Louisiana State Police	Existing
TMC	This element represents the traffic management center that is responsible for traffic management activities. The typical activities include traffic monitoring, traffic data collection, operation of ITS elements (CCTV, DMS, etc.), detection and verification of incidents, traffic signal monitoring, and other traffic management related activities. This also includes communicating with other agencies, districts, and DOTD departments such as maintenance for roadway incident management and maintenance activities.	LADOTD	Existing
Toll Plaza	Toll Plaza offices, which operate and monitor the toll plazas	LADOTD/GNOEC	Existing
Traffic Signal Systems	Field communications, field controllers, field masters, and vehicle detection on state highways (non-freeway) that are operated and maintained by the LADOTD.	LADOTD	Existing
Transportation Database	This is a data repository that collects highway operational data.	LADOTD	Existing
Workzone ITS	This refers to ITS equipment deployed to manage workzones such as workzone intrusion alarm, portable CCTV and DMS.	DOTD Contractor	Existing

5.4 ITS SERVICES

ITS services, or service packages, describe what can be done to improve the efficiency, safety, and convenience of the regional transportation system through better information, advanced systems and new technologies. Some services are specific to one primary stakeholder while others require broad stakeholder participation. **Appendix A** describes the ITS services that meet the transportation needs in the region.



6.0 USER NEEDS IDENTIFIED

Through the stakeholder engagement process, several ITS needs have been identified. These needs may be classified as extending existing functions to fill gaps or deploying new functions or introducing new functions and services. As advancements in technology continue, it becomes feasible to use novel technologies which can be more efficient or effective to meet existing and emerging needs. New technologies also enable new services that were hitherto not possible based on the technology capabilities of the past. This section discusses challenges and opportunities to enhance ITS operations and leverage emerging or proven mobility options such as mobility as a service (MaaS), integrated corridor management (ICM), connected and autonomous vehicles (CAV) technology, advanced air mobility (AAM), artificial intelligence (AI), and new data sources for integration into the Advanced Traffic Management System (ATMS) that can provide better situational awareness or intelligence for more efficient operations. Subsequent sections below will provide details on these needs.

6.1 ENGAGEMENT WITH DOTD DISTRICTS

All the Districts that make up DOTD organization were contacted during the stakeholder engagement process to obtain feedback on performance of ITS and needs in their geographic areas. The general concerns were with incident management and traveler information. There are very few detour routes available in remote rural areas. In the event of an incident, it is almost impossible to reroute travelers and that information has to be provided at distant intersections or interchanges which may provide alternate routes for travelers. The following are a list of some of the needs discussed during the engagements.

6.1.1 Traffic Signal System Operations

DOTD desires coordinated operation of traffic signal systems with communications to facilitate management of corridors. The District staff would like to know condition and state of signals for maintenance and other operational needs. This will require deployment of fiber optic communications in signalized corridors to coordinate signals and enhance traffic operations and provide Districts with remote access capability to manage the signals as needed. Several intersections may have safety issues and may need upgrades to be signalized or provide ITS solutions to make safer. For instance, intersection conflict monitoring that can warn drivers on all approaches of the roadway of potential conflict with crossing or merging vehicle.

The Districts also want to have access to traffic signal performance measures to facilitate maintenance and glean more insights into operations. One tool available is automatic traffic signal performance measures (ATSPM) which can make signal maintenance very efficient. This can be deployed even at intersections without communications using for instance a Raspberry Pi to collect and analyze data which can be retrieved later for review and implementation.



User Needs Identified

6.1.2 Corridor Monitoring

The Districts also requested deployment of cameras along critical corridors to help them have visibility in the corridor and assess how corridor is performing especially at critical intersections that can be severe bottlenecks.

6.1.3 Traveler Information System

The Districts desire traveler information system to help notify travelers of incidents, congestion or maintenance on roadways.

6.1.4 Commercial Vehicle Parking

Truck parking for commercial vehicles is an issue especially around freight corridors. Truck drivers have a limit on hours of operation (HOS) in a given time period. When drivers run the risk of exceeding hours of operation and incurring stiff penalties, they find places to park and sometimes these are unapproved locations such as exit ramps, on-ramps, shoulders, local streets, etc. Such unauthorized parking that can lead to encroach on shoulders of roadways and cause safety issues. Furthermore, damage can be done to the infrastructure which is not designed to carry heavy axle loads. District 61 identified truck parking needs at Ramah, Satsuma, and Sorrento as well the LA 22 corridor.

6.1.5 Systemic Safety

Identifying system risk factors for safety such as crashes in curves or run-of-the-road crashes and providing ITS deployments to improve safety is desired. Technologies such as connected vehicles can be solutions when these become feasible. Traffic calming to enhance safety in corridors and electronic speed enforcement could potentially help to mitigate crashes.

6.1.6 Emergency Management

There are several locations around the state where critical corridors are prone to flooding. It becomes a challenge during such emergencies to reroute traffic. The District desire a hazard mitigation plan and alternate routes for emergency management to be mapped out and the associated ITS deployments put in place to support emergency operations. The Districts would also like to have reliable means to inform travelers where to go and how to get there by road. Use of Apps to provide push notification and live feed from corridors would help.

6.2 RURAL ITS DEPLOYMENT

Rural corridors bridge the urbanized areas and provide required access for socio-economic activities. The importance of safety in rural corridors cannot be overestimated. Generally, all the ITS field deployments can be classified as rural ITS deployment because the geographic scope of the Statewide ITS is outside of the urbanized areas. Rural roads account for 80 percent of the national road network and carry about 40 percent of vehicle miles traveled (VMT).



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Rural corridors have limited options for detouring traffic and operational speeds on interstates and principal arterials tend to be high speed. In the event of a crash, the severity outcomes are higher. 57 percent of roadway fatalities occur in rural areas, whereas only 40 percent of vehicle miles traveled are on rural highways (in Louisiana there are 46% fatalities in rural areas). Furthermore, emergency response times are approximately 50 percent longer in rural areas relative to urban areas. 36% of fatal crashes in rural areas had response times greater than 60 minutes. 57 percent of all alcohol-impaired driving fatalities occur in rural areas and majority of rural crashes occur on two-lane rural roads.

There are several ITS services that are applicable to urban traffic operations and safety. These include dynamic message signs (DMS) or variable message signs (VMS) for traveler information, automatic vehicle location (AVL), intelligent work zones, communications infrastructure, road weather information system (RWIS), communications infrastructure (wireless will be required for connected vehicle applications), smart intersections, and autonomous vehicle operations.

There are several challenges that need to be addressed to deploy rural ITS. First, ITS devices need power for operation and rural environments offer few opportunities for access to power. One way to solve this problem is to use solar power. Second, in most cases the only feasible communications option is to use wireless communications which would require say a cellular company to have coverage in the area and subscription with recurring monthly cost for communications.

Third, the long distances between towns and cities make it expensive to deploy and monitor infrastructure for ITS. Smaller populations also limit local resources available for construction, operation, and maintenance of facilities. DOTD ITS Section is nonetheless committed to increasing ITS deployments in rural corridors to enhance safety, mobility and productivity. Deploying more rural ITS will also make possible the seamless management of traffic from one urbanized area to another and more importantly during emergency evacuations provide important data for GOHSEP and other Emergency Services Functions to discharge their responsibilities successfully.

6.3 GRID POWER AND ENERGY RESILIENCE

Apart from the constraints of limited funding, power availability has been one of the biggest constraints to the deployment of ITS services in the State. Most ITS deployments within the State of Louisiana use energy primarily from the grid supplied by local utility companies to power up devices for sensing and communication to the TMC. Where there is no grid power near a corridor identified with safety and mobility needs, it becomes a challenge to deploy ITS. Furthermore, dependence on power from the grid could become a single point of failure for the ITS infrastructure deployed along roadways. In the event of any power outage in the vicinity of the field devices, the TMC can neither communicate with the devices such as post messages for traveler information or use the cameras for traffic monitoring, congestion management and incident response. In the event of emergencies such as evacuation, this could pose some challenges to obtaining and sharing real-time information. While some traveler information needs may be met using apps such as 511la, Google Maps, Waze etc. which can show extent of congestion and location of incidents, this lacks the ability to target specific information that travelers need in the event of an emergency or evacuation except for 511la. Furthermore, in the connected vehicle ecosystem, field devices



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that support safety critical operations could see the connectivity to the infrastructure lost and system performance severely degraded or compromised.

In the event of grid failure, the utility provider controls the process and timing of restoration of power and may not necessarily escalate repairs or maintenance to meet ITS operational needs. DOTD recognizes the need for reliable power for some ITS deployments that are safety critical and has taken some steps to mitigate the challenges associated with grid power outages. For instance, the Queue Warning System in the I-10 corridor in Baton Rouge, uses generator power as back up source which gives DOTD control over power availability than grid power. In the I-10 corridor between Sorrento and Laplace, DOTD is also exploring the use of solar power out of necessity because the cost of providing grid power to the device sites were cost prohibitive. These solar powered devices will be evaluated for performance when in operation to see how well solar power can complement grid power and make ITS deployments more feasible in remote locations without grid power. Solar systems can also be explored for feasibility as back-up power systems to power critical ITS infrastructure.

6.4 COMMUNICATIONS INFRASTRUCTURE

The lack of communications infrastructure also impacts the deployment of ITS infrastructure. The DOTD ITS fiber optic network has significantly improved communication capability by providing abundant capacity with immunity to data surge and electromagnetic interference. However, not all device locations are in close proximity to existing DOTD fiber and the distances involved may pose a challenge with regard to the feasibility of deploying new fiber optics for communication. DOTD therefore has used a mix of communication assets. In addition to fiber optics, cellular and licensed microwave links exist to help address communications needs especially to remote locations. While secure wireless links may still be required to provide communication to distant locations in order to permit rapid deployment of devices, DOTD's preferred ITS communication is fiber optic network because of its reliability and bandwidth. A reliable communication system will ensure high performance with fewer disruptions in communication especially during emergencies.

Furthermore, with CV operations gaining momentum, DOTD would have to invest in Road Side Equipment (RSE) or Road Side Units (RSU) to enable that ecosystem to be realized and flourish. The communications requirement here by necessity is wireless and support C-V2X, since DSRC will eventually be obsolete. The timing of CV infrastructure deployment will be based on the level of CV penetration in the overall vehicle population and the benefits (safety, mobility, environment) that can be realized. DOTD has engaged in some pilot deployments along the Airline Highway (US 61) corridor in Baton Rouge, Louisiana, to help glean some insights CV operations and develop some technical expertise in-house.

There is no doubt that ITS operations in Louisiana will depend on a combination of wireless and wired communications infrastructure. However, DOTD's preferred communication is fiber optic network connecting all field devices.



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6.5 INFORMATION MANAGEMENT

Information management systems facilitate collaboration between stakeholders to ensure transportation system data required for planning, operations and maintenance can be shared. The Federal government has encouraged information sharing with state and local governments or other entities and real-time information to the traveling public. The intent is to make traffic data available in formats that can be used by all stakeholders who in turn deliver value-added information. There is a plethora of data sources, big data, being generated from diverse sources which can be leveraged for traffic operations. This data may sometimes be preprocessed before being archived which can remove information that may be important for other applications. There is therefore the need to develop a data lake that can preserve the information contained in any data that is generated, and analytical tools developed to process data while preserving the original information. This furthermore calls for data exchange protocols that will make this information ubiquitous and accessible to stakeholders who can use it to extract intelligence for use cases in transportation applications and others.

Institutional barriers become impediments to sharing information critical to the advanced transportation management systems. The success of ITS depends on obtaining and sharing useful information between all stakeholders especially real-time information for traffic operations and safety. For instance, communication between emergency response teams for incidents or emergencies is critical not just to save lives but also to mitigate the impact of an incident on the transportation system and reduce secondary accidents. Also, real-time applications for transit operations cannot be overemphasized. In a mobility as a service (MaaS) environment, real-time information and flexible transit operations are key. When stakeholders do not have effective communications, this can severely affect the overall transit management and service benefits.

6.5.1 Center-to-Center Communications

One of the critical components of the ITS infrastructure is a secure and reliable communications system. All deployed field devices on the state managed road network must have communication to the Statewide TMC to enable primary and/or secondary operations. For instance, DMS device data and fault data must be communicated between the device site and the TMC to post current road conditions or to address maintenance needs. Sufficient bandwidth should be provided for CCTV camera feeds for image surveillance, analysis and incident verification. DOTD uses a mix of communication assets to meet its needs and further details are provided. Cloud computing is also becoming popular as a communications option for ITS.

6.5.2 Cloud Computing

Cloud computing allows users to access software applications and data from any computer connected to the internet. Hence, this may eliminate direct point-to-point communication. Cloud computing is becoming more pervasive and can save agencies money and resources. Cloud computing is versatile to meet peak load requirements which typically occur over a short period of time for instance during disasters and emergencies. DOTD has used this approach to address their Advance Traveler Information System (ATIS)



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needs for base demand and emergency operations. Agencies do not have to invest scarce resources to meet the peak demands since cloud computing can afford such scalability at minimal cost. The challenge with cloud computing is security of data when using cloud-based infrastructure. The need for a secure system to protect against unauthorized intrusion or hacking is important.

6.5.3 Archived Data Management

The archived data management system represents the functions to collect, process, store and utilize transportation data including traffic, safety, maintenance and construction, transit and operations, environmental data and others. Traffic data collected includes vehicle count, vehicle classification, occupancy, density, axle load data, travel time, transit vehicle passenger boardings, passenger origins and destinations, traffic incident, traffic control systems etc. Advanced Transportation Management Systems (ATMS) require data management components to provide data fusion and analysis, summarization, visualization, and data mining to facilitate discovery of information, patterns, and correlations with other data sets. The results can be displayed on a geographic information system (GIS) to facilitate further spatial analysis that support efficient transportation infrastructure management. Protocols have to be put in place on privileges to access data especially sensitive data that may include personally identifiable information (PII).

6.5.4 Privacy and Data Security

Archive data is critical for planning and knowledge development and should be made accessible through data storage system. It is also important to protect personally identifiable information (PII). There are methods available to anonymize data to make it accessible to diverse groups. As DOTD explores services related to tolling and connected vehicles where sharing of some personal and sensitive information is required such as name, address and banking or credit card information, the need to have secure systems in place to protect this operational information is very important.

6.6 TRAFFIC MANAGEMENT

Traffic management continues to be the primary goal of ITS deployments in the State. Traffic management has focused mainly within the urbanized areas where grid power is more easily accessible. The statewide ITS architecture geographic scope is focused on corridors that are mostly in non-urbanized areas. Typically, these are high speed corridors in remote areas and crashes can lead to severe injuries or fatalities. Any changes in roadway conditions (such as incidents, weather, congestion, etc.) that occur outside of the locations with ITS devices become difficult to detect and warn other travelers of hazards. DOTD will continue to assess locations with needs and provide services as funding becomes available and other constraints removed.

6.6.1 Virtual TMC

The needs identified during the updates to the Statewide ITS Architecture in 2016 included the development of virtual TMC. This was to make it feasible for a TMC Operations staff with the right hardware at home or



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remotely to be able to provide services to the public, similar to what can be achieved from the TMC. This need was precipitated by the 2016 floods that inundated many parts of Baton Rouge and several access roads were cut off for days. The pandemic that occurred in 2019 and beyond brought with it the need for “social distancing” where individuals were required to keep a considerable distance from others (up to about six feet separation) and meeting in closed quarters or offices was discontinued or significantly reduced. Several agencies allowed employees to work from home to avoid crowding office space that could lead to rapid transmission of diseases. As ITS deployment grows and more systems are put in place, more staff will be required to operate and manage systems. Though there is a case to be made for use of technology to reduce the workload, such as use of Artificial Intelligence to monitor camera feeds for incidents, there would be coordination or aspects of a very dynamic situation where humans will be preferred. There floor spaces are any local TMC is fixed and a constraint to adding any new workstations unless some expansion is done to the infrastructure which in some cases may not be feasible and TMC would have to be relocated to a bigger facility that can accommodate needs. A Virtual TMC could help scale manpower needs to get around the challenges described above.

A virtual TMC is described as in the FHWA document “Guidelines for Virtual Transportation Management Center Development as follows:

“A Virtual TMC performs the function of monitoring, controlling, and managing the functional elements of a transportation management system through the use of computers and computer networks without having a presence at a physical nerve center or without the existence of such a physical nerve center. This includes monitoring, collecting, processing and fusing transportation system data; disseminating transportation information to outside entities; implementing control strategies that affect changes in the transportation system; and coordinating responses to traffic situations and incidents.”

To successfully implement Virtual TMC there are several things that need to be in place primarily a hardware and software, reliable communications infrastructure and secure access to agency operational data through public networks.

6.7 TRAVELER INFORMATION

Traveler information is a critical part of roadway management. Information is generally provided pre-trip and en-route to empower traveler to make optimal decisions during each trip or even weigh the trip need based on prevailing roadway conditions. When information is presented in a timely manner, traveler for instance can delay a trip until say congestion or an incident is cleared or use other roadways that are safer. There are several ways to meet traveler information needs and the subsequent section discusses some of the methods.

6.7.1 Dynamic Message Signs

Dynamic message signs (DMS) are placed by roadside to provide traveler information en-route. These are typically located at strategic locations where critical information needs to get to the public or in advance of



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interchanges or intersections to facilitate detour routing when needed. While it offers the advantage for drivers to scan messages while driving, they have the biggest limitation that it has to be in the line of sight of the driver. Messages may be occluded by other vehicles. Vehicles who enter a corridor or segment downstream of the sign cannot benefit from any traveler information. DOTD intends to deploy only limited number of DMSs going forward and use other more innovative options to get traveler information to drivers.

6.7.2 511 App

DOTD has the 511 app that the public can download and use for traveler information. This app has live camera feed and DMS messages that users can use to assess roadway conditions pre-trip and plan their route. It does not have the limitation of line of sight as other DMS do. However, using the App while driving can lead to driver distraction and minimize safety.

6.7.3 In-Vehicle Systems

There are new in-vehicle systems that can leverage connected vehicle technology to provide traveler information within the cabin of a vehicle. The use of this will be similar to any App such as the 511 App described above with the same pros and cons.

6.7.4 Virtual Sign Networks

Certain third-party platforms can provide traveler information hosting for any entity that integrates with their system, example Drivewyze. Agency sponsored events can be broadcast at specific geolocation for traveler information. This system provides a nimble way to provide traveler information where it is needed and not be constrained by location as in the DMS.

6.8 COMMERCIAL VEHICLES

6.8.1 Truck Parking

Truck parking is important for safe commercial vehicle operations. Truck drivers have guidelines on hours of operation and have limits on how many hours they can operate a commercial vehicle. This limitation is to help combat driver fatigue and keep truck operators and all other users on the roadways including vulnerable pedestrians safe. There are limited truck parking facilities along the freight corridors within the State of Louisiana which includes interstates and state routes. In the absence of truck parking facilities drivers are forced to park illegally on shoulders, ramps, other surface streets and unauthorized parking lots or other vacant spaces. Using such locations that are not typically designed for truck use can lead to significant damage. They may also pose other hazards when they occupy the shoulder. Drivers may be forced to drive over the permissible hours of service if they forgo such illegal parking to try and get to the next available truck parking. This scenario is also undesirable and can be a safety risk. Any planned truck parking facility can include electric vehicle charging and provide access to other electric vehicles to use the site. Other commercial vehicle needs are described further in this document in Appendix C.



6.8.2 Freight Advance Traveler Information System

Truck advance information is important to the State of Louisiana because of the volume of trucks that travel through the I-10, I-12 and I-20 corridors which are vital linkages for freight moving east to west and vice-versa. Timely information sent to commercial vehicle operators would help in route planning from the outset. En-route information to drivers, about congestion or incidents that will persist more than is normal, would also help drivers adjust their route or strategically wait at an appropriate parking facility in order not to be stranded and their hours of service expires. Depending on the severity of an event, detours may have to be implemented starting in neighboring states or the origin of the freight.

There are novel ways to get real-time information to truck operators without too much investment in infrastructure. For instance, Drivewyze can be integrated into existing truck operations and used to provide realtime alerts to truck drivers. For instance if there is dangerous slow down ahead, it helps to provide advance notice to truck drivers so they can reduce speeds. The Drivewyze platform has the capability to integrate into the existing electronic logging devices (ELD) in trucks for alert to pop up. This platform for instance can be leveraged and used to send specialized messages in a geofenced area. Google Maps/Waze also has the ability to ingest TMC data and provide notifications to travelers.

6.9 ELECTRIC VEHICLE CHARGING STATIONS

The State of Louisiana has developed its own electric vehicle parking plan to meet the National Electric Vehicle Infrastructure (NEVI) requirements. Adoption of electric vehicles in Louisiana continues to grow and more charging stations are needed to support this growth by reducing range anxiety. Charging stations are not as ubiquitous as gasoline stations and therefore owners must plan their routes carefully when they travel long distances or use other means. As more and more electric vehicle charging stations are deployed, this will reduce “range anxiety” and eventually eliminate this challenge often cited for poor adoption of electric vehicles apart from the initial cost of vehicle. DOTD has secured \$73 million from the federal government to support its electric vehicle charging station deployment over a five year period. The NEVI program goals include the following¹²:

1. Enable a convenient, reliable, affordable, and equitable charging experience along designated alternative fuel corridors (AFCs)
2. Encourage environmental justice by reducing transportation emissions and promoting clean air.
3. Provide electric vehicle infrastructure benefits in historically underserved communities to accomplish federal Justice40 goals
4. Achieve built-out status with publicly accessible NEVI-compliant DC (Level 3) fast chargers located every 50 miles or less within one travel mile of designated AFCs

¹²[http://www.dotd.la.gov/Inside_LaDOTD/Divisions/Operations/Electric-Vehicle/webdocs/LA%20NEVI%20RFP%20\(Draft\).pdf](http://www.dotd.la.gov/Inside_LaDOTD/Divisions/Operations/Electric-Vehicle/webdocs/LA%20NEVI%20RFP%20(Draft).pdf) (Accessed 1/11/2024)



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5. Ensure responsible use of NEVI Formula Program funds through disbursement, monitoring, reporting and oversight.

The initial deployment of the charging stations prioritizes the alternative fuel corridors (AFC) and provision of charging stations at 50-mile intervals. Safe locations with reliable power sources are desired for electric vehicle charging. Furthermore, with hurricane contingencies in the southern regions of the state, or other emergencies that can necessitate evacuation, provisions have to be made to support electric vehicle charging on evacuation routes to safe destinations. For hurricanes this could be as far as Alexandria which is considered the first major metropolitan area within the State of Louisiana that may be outside the hurricane impact zone. It is important to provide battery backup systems or generators that can support evacuees traveling in EVs.

6.9.1 Roads for EV Charging

Certain concepts for EV charging being considered include the use of the existing right of way to provide EV charging infrastructure that can facilitate charging in one of the following ways:

- **Wireless inductive charging:** This approach will use an inductive method to charge vehicles as they move. This will require embedding inductive loops in the pavement and providing power from nearby transformers. Vehicles would also have to be equipped with the ability to receive charging by inductive methods. Drivers can use in-vehicle systems or apps on a phone to accept or decline charging. Vehicles can be charged for how much energy (kilowatts) is transferred to batteries. This method has the potential to serve all vehicles in the vehicle fleet. The benefits include reducing idle time and extending an electric vehicles range. Furthermore, freight vehicles can reduce the capacity of batteries and rely on frequent charging while in motion. This reduction in battery size will significantly enhance the payload for freight and facilitate the electrification of heavy vehicles.
- **Using conductive power rail at road surface or median:** vehicles can swing out a boom that makes constant contact with a terminal while in motion.
- **Use conductive overhead contact (pantograph):** This will require the deployment of overhead cables and the vehicle swings up the pantograph make contact for charging. This approach will be feasible for heavy vehicles and more challenging to make system work for smaller vehicles which will have larger clearance between overhead cabling and the vehicle.

These options are very intrusive in the roadway environment and would impact maintenance or pavements and other roadway construction. Special locations may have to be designated where each type can be used. For instance, the overhead cables for the pantograph cannot conflict with bridges and other overhead structures (such as sign structures) and could only be used in open rural areas where power is feasible.



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6.10 WORK ZONE ITS

Work zones pose a challenge to all travelers because of the less-than-ideal lane configurations and the environment can pose serious safety and mobility issues. Crashes that occur in or near work zones can further exacerbate mobility and safety and therefore timely intervention is required to prevent secondary crashes which can lead to significant injury severity. DOTD desires the implementation of smart work zone to enhance mobility and safety. Enhanced mobility means less congestion and fewer environmental emissions. Smart work zones can use portable devices such as cameras, DMS, Variable Speed Limit (VSL), queue detection, highway advisory radios, intrusion alarms, motorist assistance patrol etc. for work zone surveillance and traveler information in critical corridors. Interstate projects that require Level 4 Transportation Management Plan (TMP) with extended construction period would be required to include work zone ITS and demonstrate how mobility and safety will be enhanced throughout the duration of construction.

6.11 ACTIVE TRAFFIC MANAGEMENT

The goal of active traffic management is to anticipate future traffic conditions and to implement traffic control strategies to mitigate any foreseen undesirable conditions. This involves active management of capacity by using travel demand management strategies. Active traffic management requires the use of predictive algorithms to forecast traffic conditions or incident clearance times. The benefits of active traffic management include the following¹³:

1. Decrease primary incidents by alerting drivers to congested conditions and promoting more uniform speeds
2. Decrease secondary incidents by alerting drivers to the presence of queues or incidents downstream
3. Increase throughput by reducing the delay associated with incidents, reducing speed differentials in traffic flow, and reducing shockwave effects.
4. Improvement in speed uniformity during congested periods in order to reduce crashes
5. Increase trip reliability by increasing capacity, reducing delays associated with incidents.

LADOTD desires the implementation of dynamic lane use control signals on bridges to facilitate management of traffic over bridge crossings especially in the event of incidents or stalled vehicles.

¹³ Active Transportation and Demand Management. U.S. Department of Transportation Federal Highway Administration



6.12 DIGITAL INFRASTRUCTURE SECURITY

LADOTD desires enhanced security for its communications network and certain critical infrastructure within the State. The extensive network of the LADOTD backbone fiber poses a challenge to secure the network from unauthorized intrusion. A reliable, resilient and secure communications infrastructure will ensure information flow and information integrity between systems and agencies especially during emergencies. Furthermore, in a CV ecosystem, network security will be important to ensure the various concepts envisioned for vehicle operational improvements and safety are met. This will be important for safety critical operations to be secured to avoid any intrusion and loss of service that could lead to fatal outcomes.

6.13 PHYSICAL INFRASTRUCTURE SURVEILLANCE

LADOTD desires protection for some physical assets such as bridges over the Mississippi River. LADOTD desires CCTV cameras to be deployed on all bridges across the Mississippi River to enable remote surveillance of the bridges. CCTV camera coverage of critical infrastructure will enable streaming of video images in real-time to law enforcement agencies for rapid identification and response to any breach in security.

6.14 ADVANCED AIR MOBILITY

Several concepts of operation for advanced air mobility are being explored, including smart hubs which are multimodal facilities that will also integrate advanced air mobility takeoff and landing or vertiports. Furthermore, various vehicles are being developed either for personal mobility or delivery of packages. There are various challenges that need to be considered including the following: psychoacoustic tests, environmental factors, corridors, community noise impact study, planning for vertiports, potential visual pollution especially from several small drone cargo delivery, route identification and trajectories for services.

There are however promising use cases for unmanned aerial systems (UAS) and indeed some Department of Transportation (DOT) have explored and integrated such systems into operations. The New England Transportation Consortium developed procedures for UAS application¹⁴ with use cases that include emergency response and recovery, bridge inspection, survey and mapping of highway, construction inspection and traffic monitoring.

6.14.1 Emergency Response and Recovery

After hurricane emergencies it is not uncommon to find debris and fallen trees blocking roadways. This renders roadway infrastructure inaccessible or hazardous to the public and even maintenance crew tasked with cleaning and evaluating status. It is important for maintenance crew to determine quickly if roadways are free from any such obstructions or hazards to allow safe passage of recovery aid, or opening up access roads for evacuees who desire to return home. Even more important is to be able to assess structural

¹⁴ New England Transportation Consortium (NETC-18-3) Integration of Unmanned Aircraft Systems (UAS) into Operations Conducted by New England Departments of Transportation (March 2021)



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integrity of bridges and other infrastructure to see if they are safe for public use. UAS (drones) can play a pivotal role in making these assessments. With UAS the maintenance crew can fly through critical corridors for visual inspection of roadways, bridges and other infrastructure faster than they can do by driving. This will speed up response times and help route traffic around major obstacles until such can be cleared.

6.14.2 Traffic Monitoring

Furthermore, with gaps in ITS camera coverage for traffic monitoring, during normal operations and especially during emergency evacuation and recovery, drones can be used to assess the “blind spots” and confirm efficiency of egress traffic or bottlenecks that may warrant a change in strategies and tactics being used to manage traffic.

6.14.3 Traffic Incident Management

UAS or drones are portable enough to be carried by emergency responders and used to assess or survey crash scenes faster. This would lead to faster response times and roadway conditions will be restored to normal conditions sooner and mitigate secondary incidents. Motorist Assistance Patrol (MAP) which may be the first on the scene can send up a drone to provide live video feed to the TMC and emergency response if the right communications protocols are in place from the MAP vehicle to the TMC. This will help with sending the appropriate resources to the incident location and pre-staging planning for incident response.

In remote areas where it takes more time to reach incident scene, advanced aerial systems which can carry first responders could reach an incident scene sooner and offer life-saving support while additional resources make their way through say congestion to the site.

6.14.4 Work Zone Monitoring and Inspection

UAS or drones can be used to monitor work zones to confirm that temporary traffic control (TTC) devices are at their right locations. They can be used to spot any TTC devices that need to be repositioned or replaced. This would make the periodic inspection of the traffic control supervisor responsible for work zone mobility and safety easier and more efficient. This technology can also be used to provide live feed of traffic through the work zone during say incident, or peak flow period to help with management of traffic.

6.14.5 Institutional Capacity and Staffing

For DOTD to leverage these promising use cases for AAM including crewed and uncrewed aerial systems, there needs to be in place resources and staff that can plan, operate, manage and maintain these systems as well as institutional procedures to guide the use of such systems. DOTD must perform risk assessments for all use cases and cognizant of how the new system will integrate into existing other operations especially in locations where there are airports or flight paths nearby. Use of these systems may be restricted at certain locations, permits and waivers may be required to ensure compliance with other local, state or federal regulations.



6.15 DIGITAL TWINNING

Digital Twin is defined as¹⁵ follows: “cyber-physical system including a real system with some capacity for dynamic control, a real-time data stream from the real system, a digital model of that real system capable of ingesting data from and simulating behavior of the real system, some sort of decision-making intelligence, and a feedback loop to induce change in the real system.” In a nutshell the digital twin mirrors the real system in its behavior and response to external actuation and typically includes some form of visualization to aid in understanding system behavior. This technology has been used in many different domains including manufacturing, construction (building information management), etc. In transportation, digital technology has seen some applications in traffic simulation and management, signal optimization, CAVs, Smart Cities, incident management, AVs and performance management among others.

The real system in this case is the transportation system, which is inclusive of the roadway infrastructure the users and the environment. Modeling and simulation is not new to traffic engineering or real-time traffic management especially where decision-support systems are designed with external models to aid response planning. In the era of the Internet of Things (IoT) there are many sensing devices on infrastructure (radar, Bluetooth, cameras, etc.), vehicles and users (pedestrians, bicyclists, scooters, etc. with wearable devices) that provide rich information on mobility in a corridor.

6.16 V2X TECHNOLOGY

The USDOT vision for V2X technology is stated as follows¹⁶: “Enable a safe, efficient, equitable, and sustainable transportation system through the national, widespread deployment of interoperable V2X technologies.” There are four types of communication in the V2X space and these are:

1. Vehicle-to-vehicle (V2V)
2. Vehicle-to-infrastructure (V2I)
3. Vehicle-to-network (V2N) and
4. Vehicle-to-pedestrian (V2P)

There have been a few V2X pilot projects implemented for various use cases that have provided evidence of the benefits of V2X technologies. Uncertainties about the use of 5.96Gz band from the Federal Communications Commission (FCC) appears to have rolled back progress into the use of dedicated short-range communication (DSRC). This has impacted early adopters of V2X applications by infrastructure

¹⁵ Digital Twin Technologies Towards Understanding the Interactions Between Transportation and Other Civil Infrastructure Systems (December 2022). Published by C2SMART Connected Cities with Smart Transportation

¹⁶ https://www.its.dot.gov/research_areas/emerging_tech/pdf/Accelerate_V2X_Deployment.pdf (Accessed 1/18/2024)



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owners and operators (IOOs) and OEMs who committed to use of DSRC had to discontinue until there was more certainty about the communications technology.

It appears the USDOT has shown commitment to the Cellular-V2X (C-V2X) technology and has removed the uncertainty around the use of this communications technology. The reasons advanced for the use of C-V2X include the following¹⁷:

1. Leverage the comprehensive coverage of secure and well-established LTE networks
2. Enable highly reliable, real-time communications at high speeds and in high-density traffic
3. Support both short-range and long-range transmissions between vehicles and roadside infrastructure
4. It is part of a roadmap to 5G connectivity

USDOT has put out a plan¹⁸ to accelerate V2X deployments and it is basing its strategy on the following core areas: Infrastructure Deployments; Vehicles; Spectrum; Interoperability; Benefits and Technical Assistance. These core areas have specific defined targets for short-term, medium-term and long-term deployment of C-V2X.

Some of the functions that a CV ecosystem will enable include the following:

1. Basic Safety Messages (BSM)
2. Signal Phase and Timing (SPaT)
3. Traveler Information Message (TIM)
4. Intersection Collision Avoidance
5. Signal Preemption Request
6. Emergency Vehicle Alert
7. Cooperative Lane Follow (cooperative adaptive cruise control, platooning)
8. Cooperative Lane Coordination (lane change, merge and weave)
9. Cooperative Traffic Management (speed control, gap control, lane assignment, queue management)

¹⁷ https://www.gsma.com/iot/wp-content/uploads/2017/12/C-2VX-Enabling-Intelligent-Transport_2.pdf (Accessed 1/18/2024)

¹⁸ https://www.its.dot.gov/research_areas/emerging_tech/pdf/Accelerate_V2X_Deployment.pdf (Accessed 1/18/2024)



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6.17 AUTONOMOUS VEHICLE TECHNOLOGY

Technology development in autonomous vehicles (AV) is primarily the responsibility of original equipment manufacturers (OEMs). There has been significant progress made in certain functions required for AV operation but there remains a lot more to be done before the technology can be fully deployed on existing roadways. As functions become mature (such as adaptive cruise control, emergency braking and lane keeping), they are deployed into newer models of vehicles as advanced driver assistance systems (ADAS). This trend will continue, and more functions will incrementally be introduced into new models of vehicles to achieve autonomous driving capability. The 11th Edition of the Manual on Uniform Traffic Control Devices (MUTCD) has categorized automation into levels 0 – 6 as shown in Table 6-1. At this time, there are still significant barriers to achieve Level 4 or Level 5 automation.

Table 6-1 – Levels of Automation (MUTCD)

Automation Level	Description	Automation Category	Automation Type
Level 0	The full-time performance by the human driver of all aspects of the Dynamic Driving Task, even when enhanced by warning or momentary intervention systems.	None*	None
Level 1	The driving mode specific execution by a sustained driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the human driver performs all remaining aspects of the Dynamic Driving Task.	Advanced Driver Assistance Systems (ADAS)	Driving Automation System
Level 2	The driving mode specific execution by one or more sustained driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the human driver performs all remaining aspects of the Dynamic Driving Task.		
Level 3	The driving mode specific sustained performance by an ADS of all aspects of the Dynamic Driving Task within a given ODD with the expectation that the human driver will respond appropriately to a request to intervene.	Automated Driving System (ADS)	
Level 4	The driving mode specific sustained performance by an ADS of all aspects of the Dynamic Driving Task, even if a human driver does not respond appropriately to a request to intervene.		
Level 5	The full-time sustained performance by an ADS of all aspects of the Dynamic Driving Task under all roadway and environmental conditions that can be managed by a human driver.		

*NOTE: Level 0 might include some ADAS features, but they are considered to be warning or momentary intervention systems at this level.

There are some responsibilities required of infrastructure owners and operators (IOOs) as well. The 11th Edition of the MUTCD recognizes some of the challenges associated with AV technology especially with perception and states: “the lack of tolerance of driving automation systems for non-uniformity in traffic control device design and application is a limiting factor of current driving automation system sophistication. This is because driving automation systems have a limited ability to interpolate across gaps in traffic control device cues.” Specific issues such as colors of signs, pavement markings in low light or varied environmental conditions, temporary traffic control signs, flaggers in work zones and electronic changeable message signs were identified. This underscores potential operational and safety hazards that that can impede deployment of this technology at scale.

6.17.1 IOO Infrastructure Requirements – AV Operations

To help improve AV perception the MUTCD has the following recommendations for signs and markings:



User Needs Identified

1. Increased delineation of where lanes begin, end, merge or change
2. Increased markings along all entrance and exit ramps and auxiliary lanes
3. Additional warning signs in advance of places where people on bikes may merge with vehicular traffic
4. Increased consistency in placement of signals and signs

6.17.2 Policies, Regulations and Guidelines

The autonomous vehicle technology development is still in progress and significant testing is on-going. Several stakeholders including OEMs and private entities and partnerships thereof are working to develop software that will perform all driving task safely. No software has been certified to be safe by any entity (NHTSA, FMCSA) for AV operations even though several developers have been permitted to test technologies on public roads with traffic. It is important to implement policies that nurture innovation while also providing the safeguards required for public safety. In the quest for a balance innovation and safety, some stakeholders are advocating implementation of dedicated AV lanes similar to dedicated bus lanes and HOV lanes to facilitate the deployment of autonomous vehicles. The following are two reasons advanced for the dedicated AV Lanes:

1. It will help mitigate the current safety concerns of automated vehicles mixing with other traffic.
2. It could help unleash more fully the potential for certain operational modes such as truck platooning and cooperative adaptive cruise control (CCAC)

While this may be true, there are also concerns about access and equity that need to be addressed.

6.17.3 Equity, Access, and Inclusivity

Questions still remain as to how AVs will impact equity, access and inclusivity. First, AVs will provide access to mobility to certain demographics who otherwise will not have the opportunity such as children, elderly people who cannot drive, blind, and any other physical impairment or other which becomes a barrier to driving as we know it today. This will open up access to opportunities and other necessities such as medical visits, banking, shopping, etc. When AVs are incorporated into transit, many transit operators believe they can offer wider service at reduced cost (cost of transit operator is very high) and there could be more flexibility in paratransit services. Geographic locations which were otherwise excluded from transit services may benefit from this service especially those at locations with very low demand.

On the other hand, there is also the fear that AVs could exacerbate existing inequalities currently experienced in underserved and disadvantaged communities especially for those who do not have much of a digital footprint – access to banking to support digital payments, smartphones etc. Also, when shared mobility is mature services significantly improve with AVs as expected, there will be fewer vehicles required to provide a given level of mobility. Many privately owned service providers who are motivated by profit would certainly not invest in many vehicles. In any extreme event with asymmetric demand such as



User Needs Identified

evacuations from floods, wildfires, hurricanes there will not be enough capacity to safely evacuate all who are affected and lead to disastrous outcomes.

6.18 ARTIFICIAL INTELLIGENCE IN TRANSPORTATION

Recent innovations in Artificial Intelligence (AI) have proven to be transformative for various aspects of society, facilitating innovations in finance, banking, healthcare, and most recently transportation. The recent resurgence in AI can be attributed to new breakthroughs in computing power, data storage, and algorithmic approaches. In practice, AI algorithms function by first learning from a myriad of examples or training data, which is then used as a point of reference for performing specific tasks. Furthermore, there are different types of AI algorithms, predictive modeling tools, learning models, and complex ensemble methods which can be selected based on their ability to complete the task at hand. Used correctly, AI can make it possible for systems to replace or augment non-automated tasks or enable new capabilities that would otherwise be unfeasible.

6.18.1 Artificial Intelligence Applications in Transportation

With respect to Intelligent Transportation Systems (ITS), the most prominent AI approach used is known as Machine Learning (ML), where computers learn from data, discover patterns, and make decisions without human intervention. Based on the task at hand, Supervised, Unsupervised, Semi-Supervised, or Reinforcement Learning ML models can be selected for implementation.

In ITS, AI can be used to replace or augment actions of field, handheld, and remote sensing devices, Connected and Automated Vehicles (CAV), TMC operations, transit and freight operations, decision-makers, and travelers. For example, Artificial Intelligence Decision Support Systems (AI-DSS) deployed in Tennessee along I-24 uses knowledge and analysis of data from multiple precedents to assist TMC Operators in making decisions. The learning data includes throughput, the number of emergency response manpower and resources and their distribution for crashes or emergency responses. Additionally, AI can be used to facilitate automated operations as with the I-95 VSL system deployed in Virginia. As with AI-DSS, the VSL Algorithm uses data from multiple precedents and inputs from field devices to derive traffic conditions but differs by automatically adjusting speeds to smooth traffic flow in lieu of relying on human intervention.

As with other forms of technology, AI is not invulnerable from risk or adverse consequences. One of the primary risks which needs to be accounted for is Data Poisoning, which can invalidate the training data used in the ML training process. Data Poisoning can be either intentional or unintentional, with the poisoned data either being deliberately input with malicious intent or accidentally included in the learning model due to a lack of oversight. This can result in logic corruption, incorrect outputs, and other considerably unfavorable outcomes. As AI continues to encroach on existing processes and tasks that determine human safety, it will be important to ensure that data used in the training models has been adequately selected and contains the suitable precedents and edge cases necessary to safeguard public safety.



User Needs Identified

Looking towards the future, the field of AI will continue to evolve rapidly due to advances in the complementary fields of robotics, C-V2X, blockchain, and computing power. From an agency-wide or policy perspective, it is essential to not pick winners or direct what AI techniques to champion without the proper foresight. Lacking the appropriate information necessary to make decisions regarding AI can result in investments in obsolete technology, selecting less robust solutions, or deploying the wrong algorithmic approach altogether. Conversely, it is also critical to not push the state-of-the-art into deployment so quickly that the technical and safety risks are too high. Therefore, there is a need to conduct periodic scans of complementary enabling technologies as well as advances in the AI field, assess the maturity and technical feasibility of innovative AI-enabled concepts, and assess the capabilities of Transportation Agencies across the U.S. and in particular Louisiana to implement these AI solutions.

6.18.2 Establishing Confidence in AI

With the positive promise of AI also comes some threats both known and unknown. First is the development of AI algorithms. The performance of AI and its usefulness in practice depends on how the model was trained and the data that was used in training. Any bias in the training set will be perpetrated. If AI is trained on any existing transportation data that has been collected in a biased way, that bias propagates into future solutions that are developed using AI. Users must therefore understand the limitations of the AI tool. Secondly, may perceive AI as a “black box” and therefore how an AI arrives at its solutions cannot be explained. Emergent behavior of AI is when AI exhibits capabilities beyond what it was designed to do. Explainable AI is important in understanding how outcomes are arrived at and help mitigate any negative outcomes of AI use. Agencies should also set up protocols to guide the use of AI in business practices.

6.19 ITS USER NEEDS (ARC-IT)

The ITS user needs identified are not exhaustive and some of the required functions to deliver services can be captured in Service Packages defined in the Architecture Reference for Cooperation and Intelligent Transportation (ARC-IT). Furthermore, to establish a common framework to further explore some of the desired functions, the ARC-IT Service Packages offer specific slices that include physical and functional objects required to provide the desired service. The Service Packages selected in the Statewide ITS Architecture are provided in Appendix A.



7.0 OPERATIONAL CONCEPT

The Operational Concept lists the roles and responsibilities that each participating agency must take on to provide the ITS services included in the Statewide ITS Architecture. This is summarized in Table 7-1 below. Changing needs may arise that will require an agreement to be formed between all affected parties that defines new or additional roles. Defining the roles and responsibilities of the participating stakeholders in the region and the willingness of agencies to accept their roles and responsibilities is an important step in realizing the common goal of an interoperable ITS system throughout the region.

Table 7-1 – Stakeholder Roles and Responsibilities

RR Name	Area	RR Area Description	Stakeholder	RR Description	RR Status
Archived Data Systems		The archived data system will be a repository of transportation data that will support LADOTD business operations: design, maintenance, operations, planning, safety, finance, environmental analysis, etc. The archive data system shall enable collection, distribution, analysis, reporting and maintenance of data. The system shall be capable of reporting data in the format that supports various business operations. The archive data management system shall also support data sharing and requests from other stakeholders such as MPOs, research organizations, and other authorized agencies.	CVO	provide freight and commercial vehicle operations data	Existing
			Department of Public Safety	provide highway safety data	Existing
			DEQ	emissions data	Existing
			DEQ	environmental data	Existing
			LADOTD	traffic monitoring data	Existing
			LADOTD	provide data for HPMS requirements	Existing
			LADOTD	ITS operations data	Existing
			LADOTD	data storage and management	Planned
			Local DPW	provide traffic count data	Planned
			Louisiana Department of Motor Vehicle	vehicle registration data	Existing
			Louisiana Department of Motor Vehicle	emissions data	Existing
			Louisiana State Police	provide incident management data	Existing
			Louisiana State Police	provide safety data	Planned
			LTRC	data management	Existing
LTRC	data analysis	Existing			



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RR Name	Area	RR Area Description	Stakeholder	RR Description	RR Status
			MPO Group	provide transportation trend data	Existing
			MPO Group	data analysis	Existing
			Planning Organizations	data analysis	Existing
			Planning Organizations	transportation trend data	Existing
Arterial Management		Arterial management refers to the development and implementation of operational strategies for signal systems in a corridor to be responsive to traffic demand so delays are reduced and safety is enhanced. Where corridor traverses different agency jurisdiction, those agencies need to collaborate to ensure signals are coordinated and operate efficiently	Department of Public Safety	incident management coordination	Existing
			Emergency Medical Services	incident management	Existing
			Emergency Medical Services	incident response	Existing
			LADOTD	traffic surveillance	Existing
			LADOTD	incident management	Existing
			LADOTD	traffic control	Existing
			Local DPW	provide maintenance of signal systems	Existing
			Local DPW	provide infrastructure maintenance	Existing
			Louisiana State Police	incident management	Existing
			Louisiana State Police	traffic control	Existing
			Media	arterial status information	Existing
Commercial Vehicle Operations		This refers to the development of ITS systems to enhance commercial vehicle operations in Louisiana. Examples are electronic credentialing and weigh-in-motion systems.	Airports	multimodal coordination	Existing
			CVO	commercial vehicle fleet management	Existing
			CVO	commercial vehicle credentialing	Existing
			LADOTD	Travel time reliability for CVO	Planned
			LADOTD	Alternate routing for commercial vehicles	Planned
			Louisiana Department of Motor Vehicle	compliance with state registration requirements	Existing



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RR Name	Area	RR Area Description	Stakeholder	RR Description	RR Status
			Louisiana Department of Motor Vehicle	compliance with federal requirements	Existing
			Louisiana Motor Transport Association	Driver credentialing	Existing
			Louisiana Motor Transport Association	Commercial vehicle operation statistics	Existing
			Louisiana State Police	electronic screening	Existing
			Louisiana State Police	safety information exchange	Existing
			Louisiana State Police	electronic credentialing	Existing
			Ports	multimodal coordination	Existing
Emergency Management		This refers to the development and implementation of systems to provide emergency services such as emergency call taking, dispatching, emergency operations center.	Department of Public Safety	implement ramp closure for contra-flow	Existing
Emergency Management		This refers to the development and implementation of systems to provide emergency services such as emergency call taking, dispatching, emergency operations center.	Department of Public Safety	traffic management	Existing
Emergency Management		This refers to the development and implementation of systems to provide emergency services such as emergency call taking, dispatching, emergency operations center.	Department of Public Safety	infrastructure security	Existing
Emergency Management		This refers to the development and implementation of systems to provide emergency services such as emergency call taking, dispatching, emergency operations center.	Department of Public Safety	event monitoring	Existing
Emergency Management		This refers to the development and implementation of systems to provide emergency services such as emergency call taking, dispatching, emergency operations center.	Department of Public Safety	incident response	Existing
Emergency Management		This refers to the development and implementation of systems to provide emergency services such as emergency call taking, dispatching, emergency operations center.	Emergency Medical Services	emergency services	Planned
Emergency Management		This refers to the development and implementation of systems to provide emergency services such as emergency call taking, dispatching, emergency operations center.	GOHSEP	emergency management	Existing
Emergency Management		This refers to the development and implementation of systems to provide emergency services such as emergency call taking, dispatching, emergency operations center.	GOHSEP	event monitoring	Existing



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RR Area Name	RR Area Description	Stakeholder	RR Description	RR Status
Emergency Management	This refers to the development and implementation of systems to provide emergency services such as emergency call taking, dispatching, emergency operations center.	GOHSEP	incident response	Existing
Emergency Management	This refers to the development and implementation of systems to provide emergency services such as emergency call taking, dispatching, emergency operations center.	LADOTD	freeway management	Existing
Emergency Management	This refers to the development and implementation of systems to provide emergency services such as emergency call taking, dispatching, emergency operations center.	LADOTD	incident management	Existing
Emergency Management	This refers to the development and implementation of systems to provide emergency services such as emergency call taking, dispatching, emergency operations center.	LADOTD	surface streets management	Existing
Emergency Management	This refers to the development and implementation of systems to provide emergency services such as emergency call taking, dispatching, emergency operations center.	Media	broadcast traveler information	Existing
Emergency Management	This refers to the development and implementation of systems to provide emergency services such as emergency call taking, dispatching, emergency operations center.	Media	broadcast public safety information	Existing
Emergency Management	This refers to the development and implementation of systems to provide emergency services such as emergency call taking, dispatching, emergency operations center.	Public	end user of emergency information	Existing
Freeway Management	Freeway management refers to the development and implementation of ITS for freeway surveillance, incident detection and response, driver advisory systems, lane control and other operational strategies to improve flow of traffic on freeway.	Department of Public Safety	speed enforcement	Existing
Freeway Management	Freeway management refers to the development and implementation of ITS for freeway surveillance, incident detection and response, driver advisory systems, lane control and other operational strategies to improve flow of traffic on freeway.	Emergency Medical Services	incident management	Existing
Freeway Management	Freeway management refers to the development and implementation of ITS for freeway surveillance, incident detection and response, driver advisory systems, lane control and other operational strategies to improve flow of traffic on freeway.	LADOTD	network surveillance	Existing
Freeway Management	Freeway management refers to the development and implementation of ITS for freeway surveillance, incident detection and response, driver advisory systems, lane control and other operational strategies to improve flow of traffic on freeway.	LADOTD	incident management	Existing



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RR Area Name	RR Area Description	Stakeholder	RR Description	RR Status
Freeway Management	Freeway management refers to the development and implementation of ITS for freeway surveillance, incident detection and response, driver advisory systems, lane control and other operational strategies to improve flow of traffic on freeway.	LADOTD	traveler information	Existing
Freeway Management	Freeway management refers to the development and implementation of ITS for freeway surveillance, incident detection and response, driver advisory systems, lane control and other operational strategies to improve flow of traffic on freeway.	Media	broadcast traveler information	Existing
Freeway Management	Freeway management refers to the development and implementation of ITS for freeway surveillance, incident detection and response, driver advisory systems, lane control and other operational strategies to improve flow of traffic on freeway.	Tourism and Traveler Information Service Providers	traveler information services	Existing
Incident Management	Incident management refers to development and implementation of systems for rapid incident detection, verification and clearance. This also involves agency coordination such as public safety and emergency services to ensure incidents are effectively handled in a short period of time.	Department of Public Safety	incident command	Planned
Incident Management	Incident management refers to development and implementation of systems for rapid incident detection, verification and clearance. This also involves agency coordination such as public safety and emergency services to ensure incidents are effectively handled in a short period of time.	Department of Public Safety	traffic control	Planned
Incident Management	Incident management refers to development and implementation of systems for rapid incident detection, verification and clearance. This also involves agency coordination such as public safety and emergency services to ensure incidents are effectively handled in a short period of time.	Department of Public Safety	incident clearance and recovery	Planned
Incident Management	Incident management refers to development and implementation of systems for rapid incident detection, verification and clearance. This also involves agency coordination such as public safety and emergency services to ensure incidents are effectively handled in a short period of time.	LADOTD	incident management	Existing
Incident Management	Incident management refers to development and implementation of systems for rapid incident detection, verification and clearance. This also involves agency coordination such as public safety and emergency services to ensure incidents are effectively handled in a short period of time.	LADOTD	traveler information	Existing



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RR Area Name	RR Area Description	Stakeholder	RR Description	RR Status
Incident Management	Incident management refers to development and implementation of systems for rapid incident detection, verification and clearance. This also involves agency coordination such as public safety and emergency services to ensure incidents are effectively handled in a short period of time.	LADOTD	freeway management	Existing
Incident Management	Incident management refers to development and implementation of systems for rapid incident detection, verification and clearance. This also involves agency coordination such as public safety and emergency services to ensure incidents are effectively handled in a short period of time.	Media	broadcast incident information	Existing
Incident Management	Incident management refers to development and implementation of systems for rapid incident detection, verification and clearance. This also involves agency coordination such as public safety and emergency services to ensure incidents are effectively handled in a short period of time.	Media	broadcast traveler information	Existing
Maintenance and Construction	This refers to the implementation of systems to manage the roadway infrastructure and coordinate maintenance activities to ensure minimal disruption of normal traffic flow. It includes managing active workzones to ensure safety for both workers and motorists.	Department of Public Safety	traffic control	Planned
Maintenance and Construction	This refers to the implementation of systems to manage the roadway infrastructure and coordinate maintenance activities to ensure minimal disruption of normal traffic flow. It includes managing active workzones to ensure safety for both workers and motorists.	Department of Public Safety	speed enforcement	Planned
Maintenance and Construction	This refers to the implementation of systems to manage the roadway infrastructure and coordinate maintenance activities to ensure minimal disruption of normal traffic flow. It includes managing active workzones to ensure safety for both workers and motorists.	LADOTD	freeway management	Existing
Maintenance and Construction	This refers to the implementation of systems to manage the roadway infrastructure and coordinate maintenance activities to ensure minimal disruption of normal traffic flow. It includes managing active workzones to ensure safety for both workers and motorists.	LADOTD	maintenance operation	Existing
Maintenance and Construction	This refers to the implementation of systems to manage the roadway infrastructure and coordinate maintenance activities to ensure minimal disruption of normal traffic flow. It includes managing active workzones to ensure safety for both workers and motorists.	LADOTD	traveler information	Existing
Maintenance and Construction	This refers to the implementation of systems to manage the roadway infrastructure and coordinate maintenance activities to ensure minimal disruption of normal traffic flow. It includes managing active workzones to ensure safety for both workers and motorists.	Media	traveler information	Existing



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RR Area Name	RR Area Description	Stakeholder	RR Description	RR Status
Maintenance and Construction	This refers to the implementation of systems to manage the roadway infrastructure and coordinate maintenance activities to ensure minimal disruption of normal traffic flow. It includes managing active workzones to ensure safety for both workers and motorists.	Tourism and Traveler Information Service Providers	traveler information	Existing
Transit Services	Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	LADOTD	support transit and paratransit services and management	Existing
Transit Services	Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	Media	disseminate public transit information	Existing
Transit Services	Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	MPO Group	support transit and paratransit management	Existing
Transit Services	Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	MPO Group	plan and develop transit and paratransit services	Existing



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RR Name	Area	RR Area Description	Stakeholder	RR Description	RR Status
Transit Services		Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	Planning Organizations	support transit and paratransit services	Existing
Transit Services		Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	Planning Organizations	plan and develop transit and paratransit services	Existing
Transit Services		Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	Public	end user of transit services	Existing
Transit Services		Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	Public Transit Providers	coordinate transit services with other regional transit providers	Existing



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RR Name	Area	RR Area Description	Stakeholder	RR Description	RR Status
Transit Services		Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	Public Transit Providers	coordinate with other stakeholders for evacuation and reentry planning	Existing
Transit Services		Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	Public Transit Providers	provide and operate transit services (transit terminals, transit stops, AVL, and transit security)	Existing
Transit Services		Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	Public Transit Providers	provide electronic fare payment systems	Existing
Transit Services		Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	Public Transit Providers	provide paratransit services	Existing



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RR Name	Area	RR Area Description	Stakeholder	RR Description	RR Status
Transit Services		Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	Public Transit Providers	provide transit traveler information	Existing
Transit Services		Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	Regional Event Promoters	coordinate transit services for events	Existing
Transit Services		Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	Regional Event Promoters	transit information dissemination	Existing
Transit Services		Transit management is focused on enhancing transit user experience by deploying technologies that the transit rider can use to access transit rider information, request services, perform electronic transactions and reservations. For the transit provider these technologies include computer aided dispatch, real -time transit vehicle tracking for expected arrival times and schedule adherence, electronic fare collection etc. There are other ITS technologies that can be implemented to support transit such as transit signal preemption.	Tourism and Traveler Information Service Providers	disseminate transit information to public	Existing
Traveler Information		Development and operation of systems for rapid dissemination of traffic information to roadway users. The systems may include roadside advisories, message boards, smartphone apps or webpages with realtime traffic information.	LADOTD	freeway status information	Existing
Traveler Information		Development and operation of systems for rapid dissemination of traffic information to roadway users. The systems may include roadside advisories, message boards, smartphone apps or webpages with realtime traffic information.	LADOTD	arterial status information	Existing



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RR Area Name	RR Area Description	Stakeholder	RR Description	RR Status
Traveler Information	Development and operation of systems for rapid dissemination of traffic information to roadway users. The systems may include roadside advisories, message boards, smartphone apps or webpages with realtime traffic information.	Media	freeway information dissemination	Existing
Traveler Information	Development and operation of systems for rapid dissemination of traffic information to roadway users. The systems may include roadside advisories, message boards, smartphone apps or webpages with realtime traffic information.	Media	arterial information dissemination	Existing
Traveler Information	Development and operation of systems for rapid dissemination of traffic information to roadway users. The systems may include roadside advisories, message boards, smartphone apps or webpages with realtime traffic information.	Public	freeway information end user	Existing
Traveler Information	Development and operation of systems for rapid dissemination of traffic information to roadway users. The systems may include roadside advisories, message boards, smartphone apps or webpages with realtime traffic information.	Public	arterial information end user	Existing
Traveler Information	Development and operation of systems for rapid dissemination of traffic information to roadway users. The systems may include roadside advisories, message boards, smartphone apps or webpages with realtime traffic information.	Tourism and Traveler Information Service Providers	freeway information	Existing
Traveler Information	Development and operation of systems for rapid dissemination of traffic information to roadway users. The systems may include roadside advisories, message boards, smartphone apps or webpages with realtime traffic information.	Tourism and Traveler Information Service Providers	arterial information	Existing



8.0 FUNCTIONAL REQUIREMENTS

Each ITS system operated by the stakeholders must perform certain functions to effectively deliver the envisioned project capabilities. The primary functions that each system needs to perform are broadly defined in the Statewide ITS Architecture as a set of Functional Objects that make up the physical elements of the architecture. As projects get implemented, requirements will need to be written to determine what each element must do to achieve its given set of functions. Those requirements can be traced back to the Needs of the Stakeholders for the project. Appendix B shows the functional objects and descriptions.



9.0 INTERFACES BETWEEN SYSTEMS

The interfaces of the transportation systems in Louisiana Statewide ITS Architecture are based on ARC-IT and tailored to reflect the plan for the region. Architecture diagrams display the transportation systems in the Louisiana Statewide ITS Architecture, and more importantly, how these systems are and will be connected with one another so information can be exchanged and transportation services can be coordinated. Stakeholders may use these diagrams to identify integration opportunities. Detailed information on the data exchanges is contained in the RAD-IT database, which can generate either a context diagram and or an interface diagram for each system in the Architecture.

A context diagram shows a particular system and all other systems with which it shares information and specifics of the information flows. Interconnects are represented as single lines and indicate information sharing without specifying the type of information being shared or the direction of the information movement. Descriptions of the information flows are included in **Appendix A**. Information about the interfaces of the systems in the region is contained in the RAD-IT database. RAD-IT can be used to create tailored interconnect and information flow diagrams for any system in the database.



10.0 COMMUNICATIONS

Communications standards are essential to cost-effective integration of ITS throughout the region. ITS standards are fundamental to the establishment of an open ITS environment that achieves the goal of interoperability for ITS. Standards facilitate deployment of interoperable systems at local, regional, national and international levels without impeding innovation as technology advances and new approaches evolve.

Establishing communications standards for exchanging information among ITS systems is important not only from an interoperability point of view; it also provides interchangeability and expandability thereby reducing risk and cost. Since an agency using standardized interfaces can select among multiple vendors for products and applications, competition is maintained and prices are lower in the long term.

In ARC-IT and in this regional architecture, the relevant communications standards for a particular interface are grouped together into ‘Communication Solutions’ that define the set of standards that are required for the interface. **Table 10-1** identifies all of the communications solutions that have been selected for this region. Frequently, more than one communications solution will be available for a given interface. Many standards overlap in applicability and offer varying features and levels of performance and security. This provides flexibility in the design of ITS systems allowing agencies to choose the most applicable communications solution for their needs. Before systems are designed, all stakeholders involved in the applicable ITS service(s) should agree on the communications solution and any required/desired tailoring. Once a decision is made, all future systems supporting that interface should use the agreed upon communications solution.

Table 10-1: Relevant Communications Solutions

Name	Type
(None-Data) - Guaranteed Secure Internet (ITS)	ARC-IT
(None-Data) - Secure Internet (ITS)	ARC-IT
(None-Data) - Secure Wireless Internet (ITS)	ARC-IT
(None-Data) - Wide Area Broadcast	ARC-IT
TPEG2 - Wide Area Broadcast	ARC-IT
US: ADMS - Secure Internet (ITS)	ARC-IT
US: ATIS - Secure Internet (ITS)	ARC-IT
US: ATIS - Secure Wireless Internet (ITS)	ARC-IT
US: ATIS - Wide Area Broadcast	ARC-IT
US: CDS - Secure Internet (ITS)	ARC-IT
US: GTFS real-time - Guaranteed Secure Internet (ITS)	ARC-IT



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Communications

Name	Type
US: GTFS real-time - Secure Internet (ITS)	ARC-IT
US: GTFS static - Secure Internet (ITS)	ARC-IT
US: NTCIP Data Collection - SNMPv3/TLS	ARC-IT
US: NTCIP Environmental Sensors - SNMPv3/TLS	ARC-IT
US: NTCIP Message Sign - SNMPv3/TLS	ARC-IT
US: NTCIP Ramp Meters - SNMPv3/TLS	ARC-IT
US: NTCIP Signal System Masters - SNMPv3/TLS	ARC-IT
US: NTCIP Traffic Signal - SNMPv3/TLS	ARC-IT
US: NTCIP Transportation Sensors - SNMPv3/TLS	ARC-IT
US: NTCIP Video Switches - SNMPv3/TLS	ARC-IT
US: SAE J3067 (J2735 SE) - Secure Internet (ITS)	ARC-IT
US: SAE J3067 (J2735 SE) - Secure Wireless Internet (ITS)	ARC-IT
US: TCIP - Guaranteed Secure Internet (ITS)	ARC-IT
US: TMDD - NTCIP Messaging	ARC-IT
US: TOMP - Secure Internet (ITS)	ARC-IT
US: TOMP - Secure Wireless Internet (ITS)	ARC-IT
US: WAVE Tolling - Local Unicast Wireless (1609.2)	ARC-IT
US: WZDx - Guaranteed Secure Internet (ITS)	ARC-IT
US: WZDx - Secure Internet (ITS)	ARC-IT



11.0 AGREEMENTS

This section identifies the list of agreements between each of the stakeholder organizations whose ITS systems will be exchanging information. There are different types of agreements that can be put into place to facilitate cooperation between stakeholders or integration of systems to support ITS operations. A Concept of Operations for any ITS project delineates the roles and responsibilities of the stakeholders identified. This will also be a good time to look at putting into place any agreements to reduce risk to project success. For instance, new agreements with local agencies can be developed as the Statewide ITS Architecture is expanded into new jurisdictions.

Appendix F shows sample video sharing agreement format between LADOTD and other entities for ITS operations including video distribution agreements with media and joint use agreement for the proposed Northshore TMC.

There are also new institutional agreements that DOTD would be required when DOTD explores some of the novel transportation capabilities discussed in this document.

For instance, if drones were required for quick access to incident scene, the pilot may require to fly the drone through otherwise restricted areas. Flying over a park, or populated area may require noise analysis and separate agreements to be established as to when and where drones can fly. It is possible to fly over otherwise occupied buildings such as schools when school is not in session.



12.0 ITS PROJECTS

The Louisiana Statewide ITS Architecture is ultimately implemented one ITS project at a time. This section lists the projects that have been identified in this architecture through the engagement period with stakeholders. These projects will address needs to enhance traffic operations and safety. A high level description and general geographic scope is provided. However during the project implementation stage, a system engineering analysis (SEA) will be performed which will yield better information for decision making on project viability, procurement methods and cost. Additional detail for each of these ITS projects would be defined in System Engineering Tool for Intelligent Transportation (SET-IT) during the project implementation phase. Summary information is included in the RAD-IT database. **Table 12-1** provides a summary of projects identified for implementation during this cycle of Statewide ITS Architecture Updates to either address gaps in the existing deployment or to add new functional capabilities



Table 12-1 – ITS Projects

Name	Description	Priority	Service Type	Geographic Scope	Funding Source	Key Stakeholders
Statewide Incident Management Program	This is a program to provide ITS applications to enhance incident management along targeted or strategic corridors. This will include mapping out detour routes at each segment and the deployment of ITS including the use of portable incident response trailers.	High	Traffic Operations /Public Assistance	Critical Corridors such as Interstates US Highways State Routes	DOTD ITS DOTD Safety	DOTD ITS DOTD Safety
Travel Time for Emergency Evacuation	Portable travel time detection devices that can be deployed during emergencies to monitor travel time in critical corridors. The portable travel time devices will be deployed in corridors critical to hurricane evacuation to determine route performance and alternate routes to support maximum throughput	High	Traffic Operations /Public Assistance	Travel time detection devices will be deployed in corridors critical to hurricane evacuation based on anticipated area of landfall.	DOTD ITS	DOTD ITS
Network Security	This project is envisaged to provide security from unauthorized intrusion into LADOTD ITS infrastructure system. Upgrade existing field network switches for intrusion prevention and detection.	High	Infrastructure Security	All locations with field access network switches	DOTD ITS	DOTD ITS
Geographic Information System for ITS Deployment and Asset Management	This project will develop a GIS system to help DOTD ITS Section track ITS deployments around the State and include projects in various stages such as planning, construction, and operations.	High	DOTD ITS Section	Statewide	DOTD ITS	DOTD ITS
Artificial Intelligence for Operations – Video Content Analytics	This project will leverage developments in Artificial Intelligence (AI) to develop or procure enhance video content analytics tool to provide rapid incident detection and management and support traffic operations and safety. Video analytics project will provide traffic detection based on video image processing. Video analytics will enable traffic data collection such as counts and classification. It can also be used in safety and security applications for automatic incident detection and presence detection.	High	TMC Operator Assistance / Incident and Congestion Detection	TMC	DOTD ITS DOTD Safety	DOTD ITS DOTD Safety DOTD Traffic Engineering
Statewide Motorist Assistance Patrol (MAP)	Project to deploy Motorist Assistance Patrol vehicles and services to monitor high crash locations and respond rapidly to incidents on road ways for faster incident clearance and reduction in secondary incidents	High	Traffic Operations /Public Assistance	Freeway Service Patrol including the following services: -TMC Support -Traffic Incident Management Services -Motorist Services (e.g., change tires, fuel, first aid, etc.) -Emergency vehicle fleet -Tow service on bridges -General contract management	DOTD ITS DOTD Safety MPOs	DOTD MPOs Local Planning Agencies
Work Zone ITS	DOTD requires contractors on large projects with long durations to install work zone ITS to improve mobility and safety for travelers within and near work zones. DOTD will require Contractor to coordinate installation of work zone ITS with existing ITS assets in work zone influence area and provide work zone data to TMC to support operations, incident management, congestion management and emergency management. These devices shall include but not limited to cameras, variable message boards or traveler information systems, detectors or traffic monitoring or any novel data source to help achieve objectives of safety and mobility. If Contractor is required to integrate work zone ITS into existing Advanced Traffic Management System (ATMS), a system engineering analysis for the integration will be required to address any risks.	High	Traffic Operations /Public Assistance	Interstates and other principal arterial projects that require lane closures with extended construction period.	DOTD ITS DOTD Safety DOTD Traffic Engineering	DOTD ITS DOTD Safety DOTD Traffic Engineering
Communication (Fiber Optics) Morgan City-Houma-New Orleans	Provide fiber communication in DOTD right of way to support ITS operations and connection of DOTD network for data sharing	High	Traffic Operations	US 90 Corridor	DOTD ITS	DOTD ITS
CCTV Camera Surveillance and Communications I-10 corridor (Lafayette to Lake Charles)	This project will provide CCTV camera coverage and communication and integration into TMC. This project will deploy CCTV cameras with PTZ capability and communications (fiber) and integration into Statewide TMC	High	Traffic Operations	Gaps in I-10 corridor (Lafayette to Lake Charles)	DOTD ITS DOTD Safety	DOTD ITS DOTD Safety



Name	Description	Priority	Service Type	Geographic Scope	Funding Source	Key Stakeholders
Traveler Information (District 07)	Traveler information (US 165, LA 28 near Leesville,) Communication between Alexandria and Leesville, Natchitoches.	High	Traffic Operations	US 165, LA 28 near Leesville	DOTD ITS DOTD Safety	DOTD ITS DOTD Safety DOTD Traffic Engineering
Future I-49/US 90 Corridor ITS from Lafayette to Houma	I-49 Connector will be a critical freight corridor and the US 90 corridor generally for evacuation from coastal areas. Deploy ITS systems for traffic monitoring, incident management, traveler information and emergency management. Provide signal communications upgrades at signalized intersections.	High	Traffic Operations	Future I-49/US 90 Corridor ITS from Lafayette to Houma	DOTD ITS DOTD Safety DOTD Traffic Engineering	DOTD ITS DOTD Safety DOTD Traffic Engineering
Alternate Route ITS (District 02 and District 62)	Alternate routes for emergency management to be mapped out and the associated ITS deployments put in place to support emergency operations. Systems shall include traffic monitoring, incident management, emergency management, traveler information and signal communications upgrades.	High	Traffic Operations	Alternate Route ITS (District 02 and District 62)	DOTD ITS DOTD Safety DOTD Traffic Engineering	DOTD ITS DOTD Safety DOTD Traffic Engineering
US 190 Signal Communication Upgrades (District 61)	Provide communications upgrades to facilitate signal coordination and support evacuation and incident management along I-12 corridor and future integrated corridor management (ICM)	High	Traffic Operations	US 190 and I-12 Corridor (District 61)	DOTD ITS DOTD Safety DOTD Traffic Engineering	DOTD ITS DOTD Safety DOTD Traffic Engineering
Truck Parking and Information System (District 62)	Provide truck parking and freight advanced traveler information system to support commercial vehicle operations and safety at Ramah, Satsuma, LA 22 Sorrento	High	Traffic Operations/Commercial Vehicle Operations	Ramah, Satsuma, LA 22 Sorrento	DOTD ITS DOTD Safety DOTD Traffic Engineering	DOTD ITS DOTD Safety DOTD Traffic Engineering
ITS Upgrades (Livingston Parish to Hammond)	Close gaps in ITS coverage along I-12 from Livingston Parish to Hammond. Services provided shall include traffic monitoring, traveler information, incident management, emergency management.	High	Traffic Operations	I-12 Corridor (Livingston Parish to Hammond)	DOTD ITS DOTD Safety	DOTD ITS DOTD Safety
Leesville ITS	Leesville US 171 is an evacuation route and needs camera coverage in that area for traffic monitoring. Traffic signal communication upgrades and fiber optic connectivity for continuous connection to District Office	High	Traffic Operations	US 171 Leesville (evacuation route)	DOTD ITS DOTD Traffic Engineering	DOTD ITS DOTD Traffic Engineering
Road Side Equipment	This project will procure a Road Side Equipment to enable DOTD harvest or share connected vehicle information from corridors. This can be located at intersections or other strategic locations of the roadway.	Medium	Traffic Operations	Interstates US Highways State Routes	DOTD ITS DOTD Safety	DOTD ITS DOTD Safety DOTD Traffic Engineering
I-49 Camera Deployment and Communication (Lafayette to Alexandria)	This project will provide CCTV camera coverage and communication and integration into TMC. This project will deploy CCTV cameras with PTZ capability and communications (fiber) and integration into Statewide TMC for congestion and incident management	Medium	Communications Support	I-49 Corridor from Lafayette to Alexandria	DOTD ITS	DOTD ITS
Asset Management System Upgrades	Upgrade of asset management system to help maintain the ITS infrastructure, the data and processes required for advanced transportation management systems.	Medium	Asset Management	ITS Assets both field and center devices (Statewide)	DOTD ITS	DOTD ITS
Bridge Surveillance – Veterans Memorial Bridge	Bridge surveillance project will provide CCTV camera and communications to monitor the bridges. This project will deploy CCTV cameras and communication Veterans Memorial Bridge across the MS River (fiber to airline and on bridge)	Medium	Traffic Operations /Infrastructure Security	Veterans Memorial Bridge	DOTD ITS DOTD Safety LSP Local Public Safety	DOTD ITS DOTD Safety LSP
Artificial Intelligence for Operations – Decision Support System	This project will leverage developments in Artificial Intelligence (AI) to develop or procure a decision support system to aid TMC Operators and Supervisors to make sound and consistent decisions to manage daily congestion, incidents and emergencies.	Medium	TMC Operator Assistance	TMC	DOTD ITS	DOTD ITS DOTD Safety DOTD Traffic Engineering



Name	Description	Priority	Service Type	Geographic Scope	Funding Source	Key Stakeholders
Bridge Surveillance – Luling Bridge	Bridge surveillance project will provide CCTV camera and communications to monitor the bridges. This project will deploy CCTV cameras and communication Luling Bridge across the MS River (include fiber to airline hwy and on bridge only)	Medium	Traffic Operations /Infrastructure Security	Luling Bridge	DOTD ITS DOTD Safety LSP Local Public Safety	DOTD ITS DOTD Safety LSP
Bridge Surveillance – St Francisville Bridge	Bridge surveillance project will provide CCTV camera and communications to monitor the bridges. This project will deploy CCTV cameras and communication on St. Francisville Bridge across the MS River	Medium	Traffic Operations /Infrastructure Security	St Francisville Bridge	DOTD ITS DOTD Safety LSP Local Public Safety	DOTD ITS DOTD Safety LSP
Bridge Surveillance – Veterans Memorial Bridge	Bridge surveillance project will provide CCTV camera and communications to monitor the bridges. This project will deploy CCTV cameras and communication Veterans Memorial Bridge across the MS River (fiber to airline and on bridge)	Medium	Traffic Operations /Infrastructure Security	Veterans Memorial Bridge	DOTD ITS DOTD Safety LSP Local Public Safety	DOTD ITS DOTD Safety LSP
Traffic Signal Performance Measures	Deploy automatic traffic signal performance measures (ATSPM) at signalized intersection to enhance operations and maintenance	Medium	Traffic Operations	Traffic Signal Systems at critical intersections (Statewide)	DOTD ITS DOTD Safety DOTD Traffic Engineering	DOTD ITS DOTD Safety DOTD Traffic Engineering
Connected Vehicle Deployment	Provide communications including roadside units and other infrastructure required for connected vehicle operations to provide the following service such as infrastructure to vehicle, infrastructure to pedestrian, services.	Medium	Traffic Operations	Strategic corridors or intersections (Statewide)	DOTD ITS DOTD Safety DOTD Traffic Engineering	DOTD ITS DOTD Safety DOTD Traffic Engineering
I-49 Corridor Traffic Monitoring	Deploy camera coverage and communications in the I-49 between the MPO boundaries of RAPC and NLCOG.	Low	Traffic Operations	I-49 Corridor (Natchitoches as priority)	DOTD ITS DOTD Safety DOTD Traffic Engineering	DOTD ITS DOTD Safety DOTD Traffic Engineering
Security Credentials Management System	This project will procure a Security Credentials Management System to facilitate connect vehicle operations is secure and safe for all users.	Low	Traffic Operations (Connected Vehicle Operations)	TMC	DOTD ITS DOTD Safety	DOTD ITS DOTD Safety DOTD Traffic Engineering



13.0 ARCHITECTURE MAINTENANCE

13.1 INTRODUCTION

This section discusses the proposed Maintenance Plan for the Statewide ITS Architecture. FHWA's Final Rule on ITS Architecture and Standards (23 CFR Part 940) requires development of an architecture maintenance plan. Paragraph 940.9 (f) states that:

“The agencies and other stakeholders participating in the development of the regional ITS architecture shall develop and implement procedures and responsibilities for maintaining it, as needs evolve within the region.”

In January 2004, FHWA issued guidance on what should be contained in an architecture maintenance plan in order to be compliant with FHWA requirements. The Maintenance Plan for the Statewide ITS Architecture is based on the guidelines provided by FHWA's White Paper¹⁹.

This report provides some background on the need for architecture maintenance and addresses key issues under the following headings:

1. Why maintain a Statewide ITS Architecture?
2. Who will maintain the Architecture?
3. When will the Architecture be updated?
4. What will be maintained?
5. How will the Architecture be maintained?

13.2 WHY MAINTAIN A STATEWIDE ITS ARCHITECTURE?

As ITS projects are implemented, the Statewide ITS architecture will need to be updated to reflect new ITS priorities and strategies that emerge through the transportation planning process. It will also need to be updated to account for expansion in ITS scope and to allow for the evolution and incorporation of new ideas. The goal of the maintenance plan is to guide controlled updates to the Statewide ITS architecture baseline so that it continues to accurately reflect the State's existing ITS capabilities and future plans.

¹⁹ http://ops.fhwa.dot.gov/its_arch_imp/guidance.htm



13.3 WHO WILL MAINTAIN THE ARCHITECTURE?

To maintain a consensus in the ITS architecture, ideally all stakeholders should participate in the process. The primary requirements of the Statewide architecture maintainer are the mission/authority to perform such functions and the necessary skills to perform the same. The mission of the ITS architecture maintainer most closely resembles a Statewide planning body that, as consistent with its mission, has the authority to initiate, update, and document changes in Statewide planning documents. For the Statewide ITS Architecture, LADOTD ITS Section will assume the role of the ITS Architecture keeper and maintainer.

The Statewide ITS planning document covers a period of 10 years however yearly meetings of the stakeholder group will allow periodic evaluation of the existing system and updates to programs or projects.

A qualified consultant to assist with the ITS architecture maintenance activities is desirable. (LADOTD has on a retainer contract a professional engineer consulting firm to provide ITS TIM Program, TMC Operations Staffing and Systems Engineering Support).

Although LADOTD ITS Section will lead the architecture maintenance activities, like all other Statewide planning activities, ITS architecture maintenance will take close coordination between several stakeholder agencies. LADOTD ITS Section will need to coordinate with other major stakeholders* in the state, including:

1. LADOTD District Offices
2. Louisiana State Police
3. Emergency Medical Services
4. Department of Public Safety
5. Department of Public Works
6. Department of Environmental Quality (DEQ)
7. LTRC
8. Metropolitan Planning Organizations

*Note – Other stakeholders may be included as necessary based on ITS development and deployment activities.

As LADOTD ITS Section takes responsibility for architecture maintenance, they will use agreements to create a management/oversight function to oversee ITS architecture maintenance work, which would have representation from the key stakeholders to the agreement as listed above. At a minimum, such a committee will include two LADOTD representatives, an MPO representative, and one FHWA representative.



It is proposed that the stakeholder group for the Statewide ITS Architecture meet at least once a year to report/discuss and recommend updates to the existing ITS Architecture. This stakeholder group will also be responsible for reporting all new ITS deployments that can be leveraged for Statewide application. LADOTD ITS Section will also be responsible for following up with all of stakeholders to ensure that any and all ITS deployments are reported and documented in the Statewide plan including updates to the Statewide ITS architectures. Other responsibilities include but are not limited to the following:

1. Verify that the Statewide ITS architecture Turbo Architecture™ source file is kept up to date with the Statewide ITS deployment projects
2. Update plans for future deployments by Statewide stakeholder
3. Review changes in State and National ITS Architectures, regulations, and requirements, if any
4. Determine any needs for an update to the Statewide ITS Architecture

13.4 WHEN WILL THE ARCHITECTURE BE UPDATED?

The Statewide ITS architecture is not static. It must change as plans change, as ITS projects are implemented, and as the ITS needs and services evolve in the State. At a minimum, the Statewide ITS architecture will be reviewed annually by the stakeholders. The stakeholders may meet and perform architecture updates more frequently to keep with the pace of the State's ITS implementation. Annual or more frequent updates will include integrating completed projects into the Statewide ITS architecture Turbo Architecture™ source file. A one page summary of the change will be added as an appendix, resulting in an addendum to the Statewide ITS architecture document.

Regardless of the frequency selected for periodic updates, it is recommended that the stakeholders recognize the potential need for "Exception Maintenance" to occur in the event of major project implementations, major revisions to the National ITS Architecture, or to meet the requirements of future regulations. It is recommended that the Statewide ITS architecture is fully updated every ten years. The following list includes many of the events that may cause change to a Statewide ITS architecture:

13.4.1 Changes in Statewide Needs

Statewide ITS architectures are created to support transportation planning in addressing Statewide needs. Over time these needs can change and the corresponding aspects of the Statewide ITS architecture that addresses these needs may need to be updated. These changes in needs should be expressed in updates to planning documents such as the Statewide Transportation Plan.

13.4.2 New Stakeholders

New stakeholders become active in ITS and the statewide ITS architecture should be updated to reflect their place in the statewide view of ITS elements, interfaces, and information flows. New stakeholders might



represent new organizations that were not in place during the original development of the statewide ITS architecture.

13.4.3 Changes in Scope of Services Considered

The range of services considered by the Statewide ITS architecture could expand. This might happen because the National ITS Architecture has been expanded and updated to include new user services or to better define how existing elements satisfy the user services. The National ITS Architecture may have expanded to include a user service that is not in the Statewide ITS architecture or was included in only a very cursory manner. Changes in the National ITS Architecture are not of themselves a reason to update a Statewide ITS architecture, but the stakeholders may want to consider any new services in the context of their statewide needs.

13.4.4 Changes in Stakeholder or Element Names

An agency's name or the name used to describe their element(s) undergoes change. Transportation agencies occasionally merge, split, or just rename themselves. In addition, element names may evolve as projects are defined. The statewide ITS architecture should be updated to use the current, correct names for both stakeholders and elements.

13.4.5 Changes in Other Architectures

A Statewide ITS architecture may interface with adjoining regional or statewide ITS architecture. Changes in the adjoining architecture may necessitate changes in the Statewide ITS Architecture to maintain consistency between the two. Architectures may also overlap (e.g. a Statewide ITS architecture and a regional ITS architecture for a region within the state) and a change in one might necessitate a change in the other.

13.4.6 Changes due to Project Definition or Implementation

There are several changes relating to project definition that will cause the need for updates to the Statewide ITS architecture. When actually defined or implemented, a project may add, subtract or modify elements, interfaces, or information flows from the Statewide ITS architecture. Because the Statewide ITS architecture is meant to describe the current, as well as future, statewide implementation of ITS, it must be updated to correctly reflect how the developed projects are integrated.

13.4.7 Changes due to Project Addition/Deletion

Occasionally a project will be added or deleted through the planning process, or through project delivery, and some aspects of the Statewide ITS architecture that are associated with the project may be expanded, changed, or removed.



13.4.8 Changes in Project Priority

Due to funding constraints, or other considerations, the planned project sequencing may change. Delaying a project may have a ripple effect on other projects that depend on it. Raising the priority for a project's implementation may impact other projects that are related to it.

13.5 WHAT WILL BE MAINTAINED?

Those constituent parts of the Statewide ITS architecture that will be maintained are referred to as the "baseline". This section considers the different "parts" of the Statewide ITS architecture and whether they should be a part of the baseline. Baseline parts are annually updated within the Statewide ITS architecture Turbo file and every ten years within the document. The parts discussed are:

- Description of Region
- List of Stakeholders
- Operational Concepts
- List of ITS Elements
- List of Agreements
- Interfaces between Elements
- System Functional Requirements
- Applicable ITS Standards
- Project Sequencing

One of the benefits of a Statewide ITS architecture is to enable the efficient exchange of information between ITS elements in one region with elements outside the region. Efficiency refers to the economical deployment of ITS elements and their interfaces. The result of these ITS deployments should be contributions to the safe and efficient operation of the surface transportation network. Each of the components in the Statewide ITS architecture below has a role in this economy and an appropriate effort should be levied to maintain them.

13.5.1 Description of Region

This description includes the geographic scope, functional scope, and architecture timeframe, and helps frame each of the following parts of a Statewide ITS architecture. Geographic scope defines the ITS elements that are "in" the State, although additional ITS elements outside the State may be needed to be described if they communicate ITS information to elements inside the State. Functional scope defines which



services are included in the ITS architecture. Architecture timeframe is the distance (in years) into the future that the Statewide ITS architecture will consider. The description of the region is usually contained in an architecture document but may reside in a database containing aspects of the Statewide ITS architecture and should certainly be a part of the baseline.

13.5.2 List of Stakeholders

Stakeholders are of great importance to the definition of the architecture. Stakeholders may consolidate or separate and such changes should be reflected in the architecture. Furthermore, stakeholders that have not been engaged in the past may be approached through outreach to be sure that the Statewide ITS architecture represents their ITS requirements as well. The stakeholders should be described in architecture documentation (and may also reside in a database representing aspects of the Statewide ITS architecture). Their listing and description should be part of the baseline.

13.5.3 Operational Concepts

It is crucial that the operational concepts represented as roles and responsibilities or as customized service packages in a Statewide ITS architecture accurately represent the consensus vision of how the stakeholders want their ITS to operate for the benefit of surface transportation users. These should be reviewed and, if necessary, changed to represent both what has been deployed (which may have been shown as “planned” in the earlier version of the statewide ITS architecture) and the current consensus view of the stakeholders. Many of the remaining maintenance efforts will depend on the outcome of the changes made here. The operational concept will reside in the architecture documentation and possibly in a diagramming tool if a customized service package approach is used and should be part of the baseline.

13.5.4 List of ITS Elements

The inventory of ITS elements is a key aspect of the statewide ITS architecture. Changes in stakeholders as well as operational concepts may impact the inventory of ITS elements. Furthermore, recent implementation of ITS elements may change their individual status (e.g. from planned to existing). The list of elements is often contained in architecture documentation and is key information in any architecture database. It is a key aspect of the baseline.

13.5.5 List of Agreements

One of the greatest values of a statewide ITS architecture is to identify where information will cross an agency boundary, which may indicate a need for an agency agreement. An update to the list of agreements can follow the update to the Operational Concept and/or interfaces between elements. The list of agreements will usually be found in the architecture documentation. This listing should be a part of the baseline.



13.5.6 Interfaces between Elements

Interfaces between elements define the “details” of the architecture. They are the detailed description of how the various ITS elements are or will be integrated throughout the timeframe of the architecture. These details are usually held in an architecture database. They are a key aspect of the architecture baseline and one that will likely see the greatest amount of change during the maintenance process.

13.5.7 System Functional Requirements

High-level functions are allocated to ITS elements as part of the Statewide ITS architecture. These can serve as a starting point for the functional definition of projects that map to portions of the Statewide ITS architecture. Usually, this information is held in spreadsheets or databases, but may be included in the architecture document. They are a part of the baseline.

13.5.8 Applicable ITS Standards

The selection of standards depends on the information exchange requirements. But in addition, the maintenance process should consider how ITS standards may have evolved and matured since the last update and consider how any change in the “standards environment” may impact previous standards choices (especially where competing standards exist). For example, if Extensive Markup Language (XML) based Center-To-Center standards reach a high level of maturity, reliability, and cost-effectiveness, then a statewide standards technology decision may be made to transition from investments in other standards technologies (e.g. Common Object Request Broker Architecture (CORBA) to XML). The description of the standards environment for statewide, as well as the details of which standards apply to the architecture, should be part of the baseline.

13.5.9 Project Sequencing

While project sequencing is partly determined by functional dependencies (e.g. “surveillance” must be a precursor to “traffic management”), the reality is that most project sequences are local policy decisions. Project sequences should be reviewed to make sure that they are in line with current policy decisions. Furthermore, policy makers should be informed of the sequences and their input should be sought to make the project sequences coincide with their expectations. This is crucial to eliminate the possibility of the Statewide ITS architecture becoming irrelevant. The project sequencing should be included in the architecture documentation and may also be held in a spreadsheet or database. These should be part of the architecture baseline.

13.6 HOW WILL THE ARCHITECTURE BE MAINTAINED?

LADOTD ITS Section (Section 56) will oversee and ensure that the Statewide architecture is maintained. The guidelines contained within FHWA’s Regional ITS Architecture Maintenance White Paper will be helpful in guiding the maintenance effort. In addition to detailing the recommended maintenance process, the White



Paper also contains examples of Maintenance Plans developed by a range of agencies and regions throughout the country.



**LOUISIANA STATEWIDE ITS ARCHITECTURE
APPENDICES**

APPENDIX A ITS SERVICE PACKAGES

Appendix Table A-1: Information Flows

Flow Name	Flow Description	Flow Status
actuate secure payment	Initiation of a payment action, ideally based on an encrypted token or biometric marker. Such a payment action could be a simple validation that the secure token allows the user access to the travel resource, or it could be the initiation of a payment transaction.	Planned
air quality information	Aggregated region-wide measured air quality data and possible pollution incident information.	Existing
alert notification	Notification of a major emergency such as a natural or man-made disaster, civil emergency, or child abduction for distribution to the public. The flow identifies the alert originator, the nature of the emergency, the geographic area affected by the emergency, the effective time period, and information and instructions necessary for the public to respond to the alert. This flow may also identify specific information that should not be released to the public.	Existing
alert notification coordination	Coordination of emergency alerts to be distributed to the public. This includes notification of a major emergency such as a natural or man-made disaster, civil emergency, or child abduction for distribution to the public and status of the public notification.	Existing
alert status	Information indicating the current status of the emergency alert including identification of the traveler and driver information systems that are being used to provide the alert.	Existing
alternate mode information	Schedule information for alternate mode transportation providers such as air, ferry, and passenger-carrying heavy rail. This also includes details of incidents and other service disruptions that have occurred in the alternative mode. This also includes measures of service demand that supports assessment of their impact on the road network.	Existing



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Appendix A ITS Service Packages

Flow Name	Flow Description	Flow Status
archive analysis requests	A user request that initiates data mining, analytical processing, aggregation or summarization, report formulation, or other advanced processing and analysis of archived data. The request also includes information that is used to identify and authenticate the user and support electronic payment requirements, if any.	Existing
archive analysis requests	A user request that initiates data mining, analytical processing, aggregation or summarization, report formulation, or other advanced processing and analysis of archived data. The request also includes information that is used to identify and authenticate the user and support electronic payment requirements, if any.	Planned
archive analysis results	Processed information products, supporting meta data, and any associated transaction information resulting from data mining, analytical processing, aggregation or summarization, report formulation, or other on-line processing and analysis of archived data.	Existing
archive request confirmation	Confirmation that an archive request has been received and processed with information on the disposition of the request.	Existing
archive request confirmation	Confirmation that an archive request has been received and processed with information on the disposition of the request.	Planned
archive status	Notification that data provided to an archive contains erroneous, missing, or suspicious data or verification that the data provided appears valid. If an error has been detected, the offending data and the nature of the potential problem are identified.	Existing
archive status	Notification that data provided to an archive contains erroneous, missing, or suspicious data or verification that the data provided appears valid. If an error has been detected, the offending data and the nature of the potential problem are identified.	Planned



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Flow Name	Flow Description	Flow Status
archived data product requests	A user-specified request for archived data products (i.e., data, meta data, or data catalogs). The request also includes information that is used to identify and authenticate the user and support electronic payment requirements, if any.	Existing
archived data product requests	A user-specified request for archived data products (i.e., data, meta data, or data catalogs). The request also includes information that is used to identify and authenticate the user and support electronic payment requirements, if any.	Planned
archived data products	Raw or processed data, meta data, data catalogs and other data products provided to a user system upon request. The response may also include any associated transaction information.	Existing
archived data products	Raw or processed data, meta data, data catalogs and other data products provided to a user system upon request. The response may also include any associated transaction information.	Planned
asset archive data	Information describing transportation assets including pavements, bridges, and all other infrastructure included in the transportation network. In addition, information can cover support assets (support equipment and systems, software, etc.). Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.	Existing
asset archive data	Information describing transportation assets including pavements, bridges, and all other infrastructure included in the transportation network. In addition, information can cover support assets (support equipment and systems, software, etc.). Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.	Planned



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Flow Name	Flow Description	Flow Status
asset restrictions	Restrictions levied on transportation asset usage based on infrastructure design, surveys, tests, or analyses. This includes standard height, width, and weight restrictions by facility as well as special restrictions such as spring weight restrictions and temporary bridge weight restrictions.	Existing
asset status update	Changes to status of pavement, bridges, signs and other assets resulting from maintenance or construction activities or infrastructure monitoring. The updates may include changes in installation information, materials information, vendor/contractor information, condition, and current maintenance status. In addition to infrastructure asset updates, the information provided may also include status of the maintenance and construction support assets, including vehicle and equipment utilization and repair records.	Existing
automated vehicle control parameters	Information, instructions, and control parameters for automated vehicle operations including current system conditions and advisories, control parameters (e.g., speed, required vehicle performance profiles, gaps or headways) and check in/checkout instructions.	Planned
automated vehicle control status	Data provided by a connected vehicle identifying it's current mode and operational status and information provided to support check-in/checkout of the lane and coordinated maneuvers while on the automated facility.	Planned
barrier system control	Information used to configure and control barrier systems that are represented by gates, barriers and other automated or remotely controlled systems used to manage entry to roadways.	Existing
booking status	Status of the freight transport booking that includes the identities of the Commercial Vehicle and driver who will pick-up the freight or a request for more information from the originator. This includes proposed transport booking changes including departure/arrival changes, conveyance changes.	Existing



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Flow Name	Flow Description	Flow Status
broadcast traveler information	General traveler information that contains traffic and road conditions, link travel times, incidents, advisories, restrictions, vehicle requirements, work zones, transit service information, weather information, parking information, and other related traveler information.	Existing
carrier participation report	Report that summarizes motor carrier participation in CVO programs. Used to identify the level of active participation and to report which enrolled carriers are not participating as expected.	Existing
commercial vehicle identities	Identification information for the Commercial Vehicle (e.g., license plate number or USDOT number), Freight Equipment (e.g., container, chassis, or trailer identification), Carrier, and Driver.	Existing
commercial vehicle location data	Current vehicle location and related operational conditions data provided by a commercial vehicle.	Planned
commercial vehicle permit	Commercial vehicle permits including those for oversize, overweight, or hazmat shipments.	Existing
cooperative adaptive cruise control parameters	Information, instructions, and control parameters for CACC operations including current system conditions and advisories, control parameters (e.g., target speeds, required vehicle profiles, recommended gaps, lane information) and cluster instructions that support CACC vehicle string creation and dissolution.	Planned
cooperative adaptive cruise control status	Data provided by a connected vehicle identifying it's current mode and operational status and information provided to support CACC string creation and dissolution.	Planned
credentials information	Response containing full vehicle fuel tax and registration credentials information. "Response" may be provided in reaction to a real-time query or a standing request for updated information. The query flow is not explicitly shown.	Existing



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Flow Name	Flow Description	Flow Status
credentials status information	Credentials information such as registration, licensing, insurance, check flags, and electronic screening enrollment data. A unique identifier is included. Corresponds to the credentials portion of CVISN "snapshots." The status information may be provided as a response to a real-time query or as a result of a standing request for updated information (subscription). This may also include information about non-U.S. fleets for use by U.S. authorities, and information regarding U.S. fleets made available to Mexican and Canadian authorities. The query flow is not explicitly shown.	Existing
current infrastructure restrictions	Restrictions levied on transportation asset usage based on infrastructure design, surveys, tests, or analyses. This includes standard facility design height, width, and weight restrictions, special restrictions such as spring weight restrictions, and temporary facility restrictions that are imposed during maintenance and construction.	Existing
cv driver record	Information typically maintained by a state driver licensing agency about a driver of a commercial vehicle including driver identification data, license data, permit data, and driving history details. The query flow is not explicitly shown.	Existing
data collection and monitoring control	Information used to configure and control data collection and monitoring systems.	Existing
data collection and monitoring control	Information used to configure and control data collection and monitoring systems.	Planned
data subscription	Data subscription includes those dialogs necessary to determine what data is available for subscription/query, and also the dialogs necessary to create or modify data subscriptions/queries.	Planned
decision support information	Information provided to support effective and safe incident response, including local traffic, road, and weather conditions, hazardous material information, and the current status of resources (including vehicles, other equipment, supplies) that have been allocated to an incident.	Existing



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Flow Name	Flow Description	Flow Status
decision support information	Information provided to support effective and safe incident response, including local traffic, road, and weather conditions, hazardous material information, and the current status of resources (including vehicles, other equipment, supplies) that have been allocated to an incident.	Planned
device configuration coordination	A handshake between two different devices in the same vehicle or conveyance so the devices don't interfere with each or send conflicting information. This coordination may result in a personal information device (PID) carried by a traveler not transmitting its current location while on board vehicle, a transit vehicle, or a micromobility vehicle transmitting its vehicle profile and current location. For example, in the carry-in scenario, the personal device might go into a 'quiet' mode when carried into the vehicle that is already equipped with an integrated system that can broadcast safety messages.	Planned
device control request	Request for device control action	Existing
device data	Data from detectors, environmental sensor stations, roadside equipment, and traffic control devices, including device inventory information.	Existing
device identification	An identifier and device type designation that is used to uniquely identify a device in the Connected Vehicle Environment.	Planned
device status	Status information from devices	Existing
electric charging services inventory	Information provided for electric charging stations identifying the location, operating hours, current availability, charging capacity and standards supported, access restrictions, and rates/fee structure.	Planned



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Flow Name	Flow Description	Flow Status
emergency archive data	Logged emergency information including information that characterizes identified incidents (routine highway incidents through disasters), corresponding incident response information, evacuation information, surveillance data, threat data, and resource information. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.	Existing
emergency archive data	Logged emergency information including information that characterizes identified incidents (routine highway incidents through disasters), corresponding incident response information, evacuation information, surveillance data, threat data, and resource information. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.	Planned
emergency dispatch requests	Emergency vehicle dispatch instructions including incident location and available information concerning the incident.	Planned
emergency dispatch response	Request for additional emergency dispatch information and provision of en route status.	Planned
emergency notification	An emergency request for assistance that is automatically initiated by a vehicle or manually initiated by a vehicle occupant or a traveler (vulnerable road user) with a personal information device. The request includes call-back number, date, time, location, pre-event vehicle heading, vehicle make, model, model year, and fuel type, and crash severity indicators. Crash severity indicators include: airbags deployed, number of impacts, crash delta velocity, principle direction of force, and rollover indication. In addition, seatbelt restraint use, number of occupants, occupant location, and intrusion may be included. For commercial vehicles, this flow may also include freight equipment type (box, flatbed, trailer, container, etc.), type of cargo (refrigerated, non-perishable, liquid, etc.), hazardous material data, quantity of cargo, and cargo permits as applicable (hazmat, special routing permissions).	Planned



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Flow Name	Flow Description	Flow Status
emergency plan coordination	Information that supports coordination of emergency management plans, continuity of operations plans, emergency response and recovery plans, evacuation plans, and other emergency plans between agencies. This includes general plans that are coordinated prior to an incident and shorter duration tactical plans that are prepared during an incident.	Existing
emergency traffic control information	Status of a special traffic control strategy or system activation implemented in response to an emergency traffic control request, a request for emergency access routes, a request for evacuation, a request to activate closure systems, a request to employ driver information systems to support public safety objectives, or other special requests. Identifies the selected traffic control strategy and system control status.	Existing
emergency traffic control request	Special request to preempt the current traffic control strategy in effect at one or more signalized intersections or highway segments, activate traffic control and closure systems such as gates and barriers, activate safeguard systems, or use driver information systems. For example, this flow can request all signals to red-flash, request a progression of traffic control preemptions along an emergency vehicle route, request a specific evacuation traffic control plan, request activation of a road closure barrier system, or place a public safety or emergency-related message on a dynamic message sign.	Existing
emergency traffic coordination	Coordination supporting disaster response including evacuation and reentry. Includes coordination of special traffic control strategies that support efficient evacuation and reentry while protecting and optimizing movement of response vehicles and other resources responding to the emergency.	Existing
emergency transit schedule information	Information on transit schedule and service changes that adapt the service to better meet needs of responders and the general public in an emergency situation, including special service schedules supporting evacuation.	Existing



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Flow Name	Flow Description	Flow Status
emergency transit schedule information	Information on transit schedule and service changes that adapt the service to better meet needs of responders and the general public in an emergency situation, including special service schedules supporting evacuation.	Planned
emergency transit service request	Request to modify transit service and fare schedules to address emergencies, including requests for transit services to evacuate people from and/or deploy response agency personnel to an emergency scene. The request may poll for resource availability or request pre-staging, staging, or immediate dispatch of transit resources.	Existing
emergency transit service response	Response indicating changes to transit service, fares, and/or restrictions that will be made and status of transit resources to be deployed to support emergency response and/or evacuation.	Existing
emergency traveler information	Public notification of an emergency such as a natural or man-made disaster, civil emergency, or child abduction. This flow also includes evacuation information including evacuation instructions, evacuation zones, recommended evacuation times, tailored evacuation routes and destinations, traffic and road conditions along the evacuation routes, traveler services and shelter information, and reentry times and instructions.	Existing
emergency traveler information	Public notification of an emergency such as a natural or man-made disaster, civil emergency, or child abduction. This flow also includes evacuation information including evacuation instructions, evacuation zones, recommended evacuation times, tailored evacuation routes and destinations, traffic and road conditions along the evacuation routes, traveler services and shelter information, and reentry times and instructions.	Planned
emergency traveler information request	Request for alerts, evacuation information, and other emergency information provided to the traveling public.	Planned



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Flow Name	Flow Description	Flow Status
emergency vehicle tracking data	The current location and operating status of the emergency vehicle.	Planned
emissions archive data	Air quality and vehicle emissions information that is collected by sensors or derived from models. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.	Existing
environmental conditions data	Current road conditions (e.g., surface temperature, subsurface temperature, moisture, icing, treatment status) and surface weather conditions (e.g., air temperature, wind speed, precipitation, visibility) as measured and reported by fixed and/or mobile environmental sensors and aggregated by the data collector. Attributes relating to the data collection (and aggregation) are also included.	Existing
environmental sensor control	Data used to configure and control environmental sensors.	Existing
environmental sensor data	Current road conditions (e.g., surface temperature, subsurface temperature, moisture, icing, treatment status) and surface weather conditions (e.g., air temperature, wind speed, precipitation, visibility) as measured and reported by fixed and/or mobile environmental sensors. Operational status of the sensors is also included.	Existing
environmental sensor data	Current road conditions (e.g., surface temperature, subsurface temperature, moisture, icing, treatment status) and surface weather conditions (e.g., air temperature, wind speed, precipitation, visibility) as measured and reported by fixed and/or mobile environmental sensors. Operational status of the sensors is also included.	Planned
evacuation coordination	Coordination of information regarding a pending or in-process evacuation. Includes evacuation zones, evacuation times, evacuation routes, forecast network conditions, and reentry times.	Existing



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Flow Name	Flow Description	Flow Status
evacuation information	Evacuation instructions and information including evacuation zones, evacuation times, and reentry times.	Existing
event confirmation	Confirmation that special event details have been received and processed.	Existing
event information	Special event information for travelers. This would include a broader array of information than the similar "event plans" that conveys only information necessary to support traffic management for the event.	Existing
event plans	Plans for major events possibly impacting traffic.	Existing
external reports	Traffic and incident information that is collected by the media through a variety of mechanisms (e.g., radio station call-in programs, air surveillance).	Existing
fare and price information	Current transit, parking, and toll fee schedule information.	Existing
freight equipment information	Container, trailer, or chassis information regarding identity, type, location, brake wear data, mileage, seal #, seal type, door open/close status, chassis bare/covered status, tethered / untethered status, temperature, humidity, power, battery levels, brake wear data, and bill of lading/information regarding the cargo/content.	Existing
hazmat notification	Information provided to emergency response organizations regarding a hazmat load including when cargo sensors detect an issue with the load such as a release of hazardous material. This information will include sensor information, vehicle identification, and carrier identification.	Planned
incident command information	Information for emergency personnel in the field that supports local tactical decision-making within an incident command system structure.	Existing



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Flow Name	Flow Description	Flow Status
incident command information coordination	Information that supports local management of an incident. It includes resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response.	Existing
incident command input	User input from emergency personnel including incident command status, incident information and resource coordination.	Existing
incident information	Notification of existence of incident and expected severity, location, time and nature of incident. As additional information is gathered and the incident evolves, updated incident information is provided. Incidents include any event that impacts transportation system operation ranging from routine incidents (e.g., disabled vehicle at the side of the road) through large-scale natural or human-caused disasters that involve loss of life, injuries, extensive property damage, and multi-jurisdictional response. This also includes special events, closures, and other planned events that may impact the transportation system.	Existing
incident information for media	Report of current desensitized incident information prepared for public dissemination through the media.	Existing
incident response coordination	Incident response procedures and current incident response status that are shared between allied response agencies to support a coordinated response to incidents. This flow provides current situation information, including a summary of incident status and its impact on the transportation system and other infrastructure, and current and planned response activities. This flow also coordinates a positive hand off of responsibility for all or part of an incident response between agencies.	Existing
incident response status	Status of the current incident response including a summary of incident status and its impact on the transportation system, traffic management strategies implemented at the site (e.g., closures, diversions, traffic signal control overrides), and current and planned response activities.	Existing



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Flow Name		Flow Description	Flow Status
incident images	scene	Real time images or video of an incident scene. This flow includes the images or video and meta data that describes the images.	Planned
incident status	scene	Information gathered at the incident site that more completely characterizes the incident and provides current incident response status.	Planned
incident warning notification	scene	Notification of an incident scene emergency or safety issue. This flow identifies that an incident scene emergency or safety issue has occurred so that warnings may be generated by more than one system in the work zone.	Planned
infrastructure monitoring sensor control		Data used to configure and control infrastructure monitoring sensors.	Existing
infrastructure monitoring sensor data		Data read from infrastructure-based sensors that monitor the condition or integrity of transportation infrastructure including bridges, tunnels, interchanges, pavement, culverts, signs, transit rail or guideway, and other roadway infrastructure. Includes sensor data and the operational status of the sensors.	Existing
infrastructure restriction warning notification		Notification to vehicle on-board equipment (OBE) that includes vehicle size (height, width, length) and weight as measured by infrastructure sensors, current infrastructure size and weight restrictions, and infrastructure restriction warning message(s) currently displayed on roadside signs.	Planned
interactive traveler information		Traveler information provided in response to a traveler request. The provided information includes traffic and road conditions, advisories, incidents, restrictions, payment information, transit services, parking information, weather information, and other travel-related data updates and confirmations.	Existing



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Flow Name	Flow Description	Flow Status
intermodal freight archive data	Information describing demand at intermodal freight terminals including loading/unloading activities of trailers and containers. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.	Existing
intersection infringement info	Vehicle path information sent by a vehicle that is performing an unpermitted movement at an intersection such as a stop sign violation or running a red light. This also includes information about possible conflicts with other road users in the vehicle's path, including a range of uncontrolled intersection scenarios that could be covered by this flow. This flow does not include permanent ids; only temporary ones that allow monitoring of the vehicle as it moves across the intersection.	Planned
intersection safety warning	A warning of an imminent unsafe vehicle infringement at an intersection that may endanger other vehicles or pedestrians. This allows vehicles approaching the intersection to be warned in the event of an imminent red light or stop sign violation or potential infringement on an occupied crosswalk. All connected vehicles and personal devices near the intersection receive the warning.	Planned
lane closure information	Lane closure information provided to passing vehicles. This flow provides information about roadway configuration changes such as lane closures and shifts.	Planned
local METR information for users	This flow supports the provision of METR information to METR Consumer Systems based on their proximity to a localized transmitter.	Planned
local signal preemption request	Direct control signal or message to a signalized intersection that results in preemption of the current control plan and grants right-of-way to the requesting vehicle.	Planned



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Flow Name	Flow Description	Flow Status
local signal priority request	Request from a vehicle to a signalized intersection for priority at that intersection. This flow also allows the vehicle to cancel a priority request (for example, when the vehicle clears the intersection).	Planned
local situation data	This general flow represents the traffic, environmental, and emissions situation data that is collected from connected vehicles by an RSE, aggregated, filtered, and provided to a back-office center. It also includes data collected from ITS roadway equipment that provides current intersection and road network status for the area proximate to the RSE.	Existing
logged vehicle routes	Anticipated route information for guided vehicles, special vehicles (e.g., oversized vehicles) or groups of vehicles (e.g., governor's motorcade) that may require changes in traffic control strategy.	Existing
maint and constr archive data	Information describing road construction and maintenance activities identifying the type of activity, the work performed, and work zone information including work zone configuration and safety (e.g., a record of intrusions and vehicle speeds) information. For construction activities, this information also includes a description of the completed infrastructure, including as-built plans as applicable. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.	Existing
maint and constr resource request	Request for road maintenance and construction resources that can be used in the diversion of traffic (cones, portable signs), clearance of a road hazard, repair of ancillary damage, or any other incident response. The request may poll for resource availability or request pre-staging, staging, or immediate dispatch of resources.	Existing
maint and constr resource response	Current status of maintenance and construction resources including availability and deployment status. General resource inventory information covering vehicles, equipment, materials, and people and specific resource deployment status may be included.	Existing



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Flow Name	Flow Description	Flow Status
maint and constr work plans	Future construction and maintenance work schedules and activities including anticipated closures with anticipated impact to the roadway, alternate routes, anticipated delays, closure times, and durations.	Existing
maintenance and repair needs	Recommended strategies and schedules for maintenance of the transportation infrastructure.	Existing
parking archive data	Data used to analyze and monitor trends in parking demand, pricing, and operational actions. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.	Existing
parking information	General parking information and status, including current parking availability, parking pricing, and parking space availability information, including features like number and type of electric charging spots.	Existing
parking information	General parking information and status, including current parking availability, parking pricing, and parking space availability information, including features like number and type of electric charging spots.	Planned
payment instructions	Information provided to configure and support fixed point payment operations including pricing information, user account information, and operational parameters used to control equipment that controls access, collects payment, and detects and processes violations.	Existing
payment transactions	Detailed list of transactions including violations. Each transaction includes the date/time, vehicle/customer, and transaction amount. Additional information is included to support delayed payment and violation processing.	Existing
permission application	A request for permission to access a Connected Vehicle service by an end-user that requires enrollment. This may include services granted to drivers of low emissions vehicles or pedestrians with special needs that require extended crossing times for example.	Planned



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Flow Name	Flow Description	Flow Status
personal transit information	General and personalized transit information for a particular fixed route, flexible route, or paratransit system.	Existing
queue warning information	Information regarding formed or impending queues (location of the end of queue, estimated duration of the queue, and other descriptions of the queue condition) and recommendations for upstream vehicles including speed reduction, lane change, or diversion recommendations.	Planned
reduced speed warning info	Real time notification of vehicle detections, measured vehicle characteristics (e.g., vehicle height), speed measurements, and warnings issued by roadway infrastructure. This flow can also include roadway configuration data, current speed limits, and warning parameters and thresholds enabling local speed management application configuration and management.	Planned
remote surveillance control	The control commands used to remotely operate another center's sensors or surveillance equipment so that roadside surveillance assets can be shared by more than one agency.	Existing
resource coordination	Coordination of resource inventory information, specific resource status information, resource prioritization and reallocation between jurisdictions, and specific requests for resources and responses that service those requests.	Existing
resource deployment status	Status of resource deployment identifying the resources (vehicles, equipment, materials, and personnel) available and their current status. General resource inventory information and specific status of deployed resources may be included.	Existing
resource request	A request for resources to implement special traffic control measures, assist in clean up, verify an incident, etc. The request may poll for resource availability or request pre-staging, staging, or immediate deployment of resources. Resources may be explicitly requested or a service may be requested and the specific resource deployment may be determined by the responding agency.	Existing



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Flow Name	Flow Description	Flow Status
restricted lanes information	This flow defines the location, duration, and operating parameters for lanes that are reserved for the exclusive use of certain types of vehicles (e.g., transit vehicles) or vehicles that meet other qualifications (e.g., number of occupants, low emissions criteria). It identifies the lane(s), the start and stop locations, start and end times, vehicle restrictions, speed limits and platooning parameters.	Planned
road closure information	Road closure information provided to passing vehicles. This flow provides information about the road closure with diversion information.	Planned
road network conditions	Current and forecasted traffic information, road and weather conditions, and other road network status. Either raw data, processed data, or some combination of both may be provided by this flow. Information on diversions and alternate routes, closures, and special traffic restrictions (lane/shoulder use, weight restrictions, width restrictions, HOV requirements) in effect is included.	Existing
road network status assessment	Assessment of damage sustained by the road network including location and extent of the damage, estimate of remaining capacity, required closures, alternate routes, necessary restrictions, and time frame for repair and recovery.	Existing
road pricing equipment status	Provides an indication of the operational status of the road pricing data collection equipment in a vehicle. Also indicates vehicle ID (VIN) so that the registration of the equipment to a specific vehicle can be verified and confirmed by comparison with vehicle characteristics.	Planned
road use charges	Road use charges per link.	Planned
road use history	A vehicle's road use history that records where the vehicle has traveled over time. Optionally includes vehicle speeds as well as distance traveled for some applications. Information is accurate enough to distinguish between adjacent roads, adjacent lanes, and identify direction of travel on the roads.	Planned



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Flow Name	Flow Description	Flow Status
road weather advisories	Segment-specific weather and road conditions including real-time advisories of deteriorating road and weather conditions, medium-term advisories for the next 2-12 hours, and long-term advisories more than 12 hours into the future. The advisories may include advisories that are issued based on locally collected environmental data (e.g., an ice on bridge advisory).	Planned
road weather information	Road conditions and weather information that are made available by road maintenance operations to other transportation system operators.	Existing
roadside archive data	A broad set of data derived from roadside sensors that includes current traffic conditions, environmental conditions, and any other data that can be directly collected by roadside sensors. This data also indicates the status of the sensors and reports of any identified sensor faults.	Existing
roadside archive data	A broad set of data derived from roadside sensors that includes current traffic conditions, environmental conditions, and any other data that can be directly collected by roadside sensors. This data also indicates the status of the sensors and reports of any identified sensor faults.	Planned
roadway dynamic signage data	Information used to initialize, configure, and control dynamic message signs. This flow can provide message content and delivery attributes, local message store maintenance requests, control mode commands, status queries, and all other commands and associated parameters that support remote management of these devices.	Existing
roadway dynamic signage data	Information used to initialize, configure, and control dynamic message signs. This flow can provide message content and delivery attributes, local message store maintenance requests, control mode commands, status queries, and all other commands and associated parameters that support remote management of these devices.	Planned
roadway dynamic signage status	Current operating status of dynamic message signs.	Existing



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Flow Name	Flow Description	Flow Status
roadway maintenance status	Summary of maintenance fleet operations affecting the road network. This includes the status of winter maintenance (snow plow schedule and current status).	Existing
safety status information	Safety information such as safety ratings, security ratings or flags, inspection summaries, and violation summaries. A unique identifier is included. Corresponds to the safety and security portion of CVISN "snapshots." The status information may be provided as a response to a real-time query or as a result of a standing request for updated information (subscription). This may also include information about non-U.S. fleets for use by U.S. authorities, and information regarding U.S. fleets made available to Mexican and Canadian authorities. The query flow is not explicitly shown.	Existing
service advertisement	An advertisement of available services and identification of how those services may be accessed (e.g., RF parameters, identifiers, etc.). Services include network services such as IPv6 routing, public roadside services such as intersection safety, back office services including situation data services and security credentials, or private services.	Planned
service patrol dispatch request	Service patrol dispatch instructions including incident location and available information concerning the incident.	Planned
service patrol dispatch response	Request for additional dispatch information and provision of en route status.	Planned
service patrol incident status	Information gathered at the incident site by a service patrol vehicle that more completely characterizes the incident, the services provided, and clearance status.	Planned
signal control commands	Control of traffic signal controllers or field masters including clock synchronization.	Existing



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Flow Name		Flow Description	Flow Status
signal control device configuration		Data used to configure traffic signal control equipment including local controllers and system masters.	Existing
signal control plans		Traffic signal timing parameters including minimum green time and interval durations for basic operation and cycle length, splits, offset, phase sequence, etc. for coordinated systems.	Existing
signal control status		Operational and status data of traffic signal control equipment including operating condition and current indications.	Existing
signal fault data		Faults reported by traffic signal control equipment.	Existing
signal priority status		In response to a request for signal priority, this flow indicates the status of the priority or preemption request.	Planned
signal system configuration		Data used to configure traffic signal systems including configuring control sections and mode of operation (time based or traffic responsive).	Existing
speed management information		Target speeds, speed advisories, and/or speed limit information provided to a vehicle. The information includes the current speed value(s), the route segment(s) and lane(s) where the speeds apply, and an indication of whether the speeds are suggested target speeds, posted advisory speeds, or enforceable speed limit values. This flow may also include information about the reason for reduced speeds and provide target lane information if lane changes are required.	Planned
stolen vehicle signal activation		Command to remotely enable a radio transmitter onboard a specific stolen vehicle to begin transmitting a radio signal that can be used to identify a bearing to the vehicle to support vehicle recovery.	Planned



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Flow Name	Flow Description	Flow Status
traffic archive data	Information describing the use and vehicle composition on transportation facilities and the traffic control strategies employed. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.	Existing
traffic archive data	Information describing the use and vehicle composition on transportation facilities and the traffic control strategies employed. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.	Planned
traffic detector control	Information used to configure and control traffic detector systems such as inductive loop detectors and machine vision sensors.	Existing
traffic detector data	Raw and/or processed traffic detector data which allows derivation of traffic flow variables (e.g., speed, volume, and density measures) and associated information (e.g., congestion, potential incidents). This flow includes the traffic data and the operational status of the traffic detectors	Existing
traffic detector data	Raw and/or processed traffic detector data which allows derivation of traffic flow variables (e.g., speed, volume, and density measures) and associated information (e.g., congestion, potential incidents). This flow includes the traffic data and the operational status of the traffic detectors	Planned
traffic gap information	Measured gap to the next approaching vehicle per lane and direction of travel	Planned
traffic images	High fidelity, real-time traffic images suitable for surveillance monitoring by the operator or for use in machine vision applications. This flow includes the images. Meta data that describes the images is contained in another flow.	Existing



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Flow Name	Flow Description	Flow Status
traffic information for media	Report of traffic conditions including traffic incident reports for public dissemination through the media. The reports may also include information on diversions and alternate routes, closures, and special traffic restrictions in effect.	Existing
traffic metering status	Current operational status and operating parameters for ramp meters, interchange meters, mainline meters and other control equipment associated with roadway metering operations.	Existing
transit and fare schedules	Transit service information including routes, schedules, and fare information. This also includes on-demand service information.	Existing
transit and fare schedules	Transit service information including routes, schedules, and fare information. This also includes on-demand service information.	Planned
transit fare information	Information provided by transit management that supports fare payment transactions.	Existing
transit information user request	Request for special transit routing, real-time schedule information, and availability information.	Existing
transit schedule adherence information	Dynamic transit schedule adherence and transit vehicle location information.	Existing
transportation system status	Current status and condition of transportation infrastructure (e.g., tunnels, bridges, interchanges, TMC offices, maintenance facilities). In case of disaster or major incident, this flow provides an assessment of damage sustained by the surface transportation system including location and extent of the damage, estimate of remaining capacity and necessary restrictions, and time frame for repair and recovery.	Existing



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Flow Name	Flow Description	Flow Status
traveler alerts	Traveler information alerts reporting congestion, incidents, adverse road or weather conditions, restrictions, vehicle requirements, parking availability, transit service delays or interruptions, and other information that may impact the traveler. Relevant alerts are provided based on traveler-supplied profile information including trip characteristics and preferences.	Existing
traveler alerts	Traveler information alerts reporting congestion, incidents, adverse road or weather conditions, restrictions, vehicle requirements, parking availability, transit service delays or interruptions, and other information that may impact the traveler. Relevant alerts are provided based on traveler-supplied profile information including trip characteristics and preferences.	Planned
traveler archive data	Data associated with traveler information services including service requests, facility usage, rideshare, routing, and traveler payment transaction data. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.	Existing
traveler information for media	General traveler information regarding incidents, unusual traffic conditions, transit issues, or other advisory information that has been desensitized and provided to the media.	Existing
traveler request	A request for traveler information including traffic, transit, toll, parking, road weather conditions, event, and passenger rail information. The request identifies the type of information, the area of interest, parameters that are used to prioritize or filter the returned information, and sorting preferences.	Existing
traveler request	A request for traveler information including traffic, transit, toll, parking, road weather conditions, event, and passenger rail information. The request identifies the type of information, the area of interest, parameters that are used to prioritize or filter the returned information, and sorting preferences.	Planned



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Flow Name	Flow Description	Flow Status
trip request	Request for trip planning services that identifies the trip origin, destination(s), timing, preferences, and constraints. The request may also include the requestor's location or a request for transit and parking reservations, electric charging station access, and ridesharing options associated with the trip. The trip request also covers requests to revise a previously planned trip and interim updates that are provided as the trip is interactively planned.	Planned
user profile	Information provided to register for a travel service and create a user account. The provided information includes personal identification, traveler preferences (e.g., travel mode, micro-mobility options, accessibility needs, and assistance needs), priorities for the preferences, device information, a user ID and password, and information to support payment transactions, if applicable.	Existing
user profile	Information provided to register for a travel service and create a user account. The provided information includes personal identification, traveler preferences (e.g., travel mode, micro-mobility options, accessibility needs, and assistance needs), priorities for the preferences, device information, a user ID and password, and information to support payment transactions, if applicable.	Planned
vehicle cluster coordination	Coordination between CACC-equipped vehicles that enable formation and management of strings of adjacent equipped vehicles that coordinate speed management across the string. This flow includes coordination between CACC-equipped vehicles that enable adjacent vehicles in the same lane to identify each other and couple. Depending on the CACC implementation, this flow also supports identification of the lead vehicle in the string, operating performance parameters for the string, destination information so that drivers can join strings that share their destination, and coordination so that strings of vehicles are ordered based on the individual weight and performance profile of each participating vehicle. This flow also supports dissolution of CACC vehicle strings as vehicles depart from the string.	Planned



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Flow Name	Flow Description	Flow Status
vehicle collision information	The current status of the vehicle systems following a collision including air bag deployment, number of passengers, seat belt usage, sensor data that indicates crash severity (e.g., Delta V speed profile during the crash, vehicle damage, number of impacts), and vehicle type/make/model.	Planned
vehicle environmental data	Data from vehicle safety and convenience systems that can be used to estimate environmental and infrastructure conditions, including measured air temperature, exterior light status, wiper status, sun sensor status, rain sensor status, traction control status, anti-lock brake status, vertical acceleration and other collected vehicle system status and sensor information. The collected data is reported along with the location, heading, and time that the data was collected. Both current data and snapshots of recent events (e.g., traction control or anti-lock brake system activations) may be reported.	Planned
vehicle location and motion	Data describing the vehicle's location in three dimensions, heading, speed, acceleration, braking status, and size.	Planned
vehicle location and motion for surveillance	Data describing the vehicle's location in three dimensions, heading, speed, acceleration, braking status, and size. This flow represents monitoring of basic safety data ('vehicle location and motion') broadcast by passing connected vehicles for use in vehicle detection and traffic monitoring applications.	Planned
vehicle payment information	Information provided for payment of tolls, parking, and other transportation fees including identification that can be used to identify the payment account or source and related vehicle and service information that are used to determine the type and price of service requested. This flow supports one-time payments that may not be associated with a service account. See also 'actuate secure payment'. The information exchange normally supports an account debit to pay fees, but an account credit may be initiated where pricing strategies include incentives.	Existing



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Flow Name	Flow Description	Flow Status
vehicle payment information	Information provided for payment of tolls, parking, and other transportation fees including identification that can be used to identify the payment account or source and related vehicle and service information that are used to determine the type and price of service requested. This flow supports one-time payments that may not be associated with a service account. See also 'actuate secure payment'. The information exchange normally supports an account debit to pay fees, but an account credit may be initiated where pricing strategies include incentives.	Planned
vehicle payment update	Data written to vehicle equipment to support electronic toll collection or parking payment.	Existing
vehicle payment update	Data written to vehicle equipment to support electronic toll collection or parking payment.	Planned
vehicle platoon coordination	Coordination of control commands between leader and follower vehicles allowing vehicles to join, coordinate with, and separate from platoons of cooperative vehicles. This flow shares platoon size, location, and performance parameters (e.g., platoon speed and spacing) between platooned vehicles.	Planned
vehicle profile	Information about a vehicle such as vehicle make and model, fuel type, engine type, size and weight, vehicle performance and level of control automation, average emissions, average fuel consumption, passenger occupancy, or other data that can be used to classify vehicle eligibility for access to specific lanes, road segments, or regions or participation in cooperative vehicle control applications.	Planned
vehicle security status	Vehicle location and current status information that is used to remotely monitor unattended vehicles for potential break in, theft, or other malicious acts. Status information is updated when the vehicle alarm is activated, the vehicle is physically touched, jostled, or entered, the vehicle is started, or the vehicle is moved.	Planned



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Flow Name	Flow Description	Flow Status
vehicle situation data	This flow represents vehicle snapshots that may be provided by the vehicle to support traffic and environmental conditions monitoring. Snapshots are collected by the vehicle for specific events (e.g., when a sensor exceeds a threshold) or periodically and reported based on control parameters when communications is available. Traffic-related data includes snapshots of measured speed and heading and events including starts and stops, speed changes, and other vehicle control events. Environmental data may include measured air temperature, exterior light status, wiper status, sun sensor status, rain sensor status, traction control status, anti-lock brake status, and other collected vehicle system status and sensor information. The collected data is reported along with the location, heading, and time that the data was collected.	Planned
video surveillance control	Information used to configure and control video surveillance systems.	Existing
wayfinding request	Request for wayfinding planning services that identifies the trip origin, destination(s), timing, preferences, and constraints. The request may also include customization of the request based on a traveler profile as well as the requestor's location. The wayfinding request also covers requests to revise a previously planned wayfinding plan and interim updates that are provided as the wayfinding portion of an overall trip is interactively planned.	Planned
work plan feedback	Comments and suggested changes to proposed construction and maintenance work schedules and activities. This information influences work plan schedules so that they minimize impact to other system operations and the overall transportation system.	Existing



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Flow Name	Flow Description	Flow Status
work zone information	Summary of maintenance and construction work zone activities affecting the road network including the nature of the maintenance or construction activity, location, impact to the roadway, expected time(s) and duration of impact, anticipated delays, alternate routes, and suggested speed limits. This information may be augmented with images that provide a visual indication of current work zone status and traffic impacts.	Existing
work zone warning notification	Notification of a work zone emergency or safety issue. This flow identifies that a work zone emergency or safety issue has occurred so that warnings may be generated by more than one system in the work zone.	Planned
wrong way vehicle detected	Notification that a vehicle has been detected traveling in the wrong direction. This can be a direct report by an equipped vehicle that is being driven in the wrong direction or a report of a non-equipped vehicle that has been detected traveling in the wrong direction. It includes the current location, speed, acceleration, and heading of the wrong way vehicle.	Planned

Appendix Table A-2: ITS Service Packages

Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
CVO01	Carrier Operations and Fleet Management	This service package manages a fleet of commercial vehicles. The Fleet and Freight Management Center monitors the vehicle fleet and can provide routes using either an in-house capability or an external provider. Routes generated by either approach are constrained by hazardous materials and other restrictions (such as height or weight). A route is electronically sent to the Commercial Vehicle with any appropriate dispatch instructions. The location of the Commercial Vehicle can be monitored by the Fleet and Freight Management Center and routing changes can be made depending on current road network conditions. This service package also supports maintenance of fleet vehicles with on-board monitoring equipment. Records of vehicle mileage, preventative maintenance and repairs are maintained.	Existing	Ports



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
CVO03	Electronic Clearance	This service package provides for automated clearance at roadside check facilities. The roadside check facility communicates with the Commercial Vehicle Administration Center to retrieve infrastructure snapshots of critical carrier, vehicle, and driver data to be used to sort passing vehicles. This allows a good driver/vehicle/carrier to pass roadside facilities at highway speeds using vehicle to infrastructure (V2I) Communications. Results of roadside clearance activities will be passed on to the Commercial Vehicle Administration Center. The roadside check facility may be equipped with Automated Vehicle Identification (AVI), weighing sensors, communications equipment, and computer workstations. Communications may be implemented using a range of technologies from transponder data readers through connected vehicle short range communications.	Existing	Commercial Vehicle Operators
CVO03	Electronic Clearance	This service package provides for automated clearance at roadside check facilities. The roadside check facility communicates with the Commercial Vehicle Administration Center to retrieve infrastructure snapshots of critical carrier, vehicle, and driver data to be used to sort passing vehicles. This allows a good driver/vehicle/carrier to pass roadside facilities at highway speeds using vehicle to infrastructure (V2I) Communications. Results of roadside clearance activities will be passed on to the Commercial Vehicle Administration Center. The roadside check facility may be equipped with Automated Vehicle Identification (AVI), weighing sensors, communications equipment, and computer workstations. Communications may be implemented using a range of technologies from transponder data readers through connected vehicle short range communications.	Existing	Commercial Vehicles
CVO03	Electronic Clearance	This service package provides for automated clearance at roadside check facilities. The roadside check facility communicates with the Commercial Vehicle Administration Center to retrieve infrastructure snapshots of critical carrier, vehicle, and driver data to be used to sort passing vehicles. This allows a good driver/vehicle/carrier to pass roadside facilities at highway speeds using vehicle to infrastructure (V2I) Communications. Results of roadside clearance activities will be passed on to the Commercial Vehicle Administration Center. The roadside check facility may be equipped with Automated Vehicle Identification (AVI), weighing sensors, communications equipment, and computer workstations. Communications may be implemented using a range of technologies from transponder data readers through connected vehicle short range communications.	Existing	CVO Inspection Stations



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
CVO04	CV Administrative Processes	This service package supports program administration and enrollment and provides for electronic application, processing, fee collection, issuance, and distribution of CVO credential and tax filing. Through this process, carriers, drivers, and vehicles may be enrolled in a variety of programs including electronic clearance and wireless inspection programs which allow commercial vehicles to be screened at mainline speeds. Through this enrollment process, current profile databases are maintained in the Commercial Vehicle Administration Center and snapshots of this data are made available to the roadside check facilities. Current program status is maintained and made available to carriers, drivers, and other authorized users of the data. Enrolled carriers are provided the option to review and challenge the collected data. Commercial Vehicle Administration Centers can share current program status and credential information with other Centers, so that it is possible for any Commercial Vehicle Administration Center to have access to all credentials, credential fees, credentials status and safety status information. In addition, it is possible for one Commercial Vehicle Administration Center to collect HAZMAT route restrictions information from other Commercial Vehicle Administration Centers and then act as a clearinghouse for this route restrictions information.	Existing	Commercial Vehicle Operators
CVO04	CV Administrative Processes	This service package supports program administration and enrollment and provides for electronic application, processing, fee collection, issuance, and distribution of CVO credential and tax filing. Through this process, carriers, drivers, and vehicles may be enrolled in a variety of programs including electronic clearance and wireless inspection programs which allow commercial vehicles to be screened at mainline speeds. Through this enrollment process, current profile databases are maintained in the Commercial Vehicle Administration Center and snapshots of this data are made available to the roadside check facilities. Current program status is maintained and made available to carriers, drivers, and other authorized users of the data. Enrolled carriers are provided the option to review and challenge the collected data. Commercial Vehicle Administration Centers can share current program status and credential information with other Centers, so that it is possible for any Commercial Vehicle Administration Center to have access to all credentials, credential fees, credentials status and safety status information. In addition, it is possible for one Commercial Vehicle Administration Center to collect HAZMAT route restrictions information from other Commercial Vehicle Administration Centers and then act as a clearinghouse for this route restrictions information.	Existing	CVO Inspection Stations



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
CVO04	CV Administrative Processes	This service package supports program administration and enrollment and provides for electronic application, processing, fee collection, issuance, and distribution of CVO credential and tax filing. Through this process, carriers, drivers, and vehicles may be enrolled in a variety of programs including electronic clearance and wireless inspection programs which allow commercial vehicles to be screened at mainline speeds. Through this enrollment process, current profile databases are maintained in the Commercial Vehicle Administration Center and snapshots of this data are made available to the roadside check facilities. Current program status is maintained and made available to carriers, drivers, and other authorized users of the data. Enrolled carriers are provided the option to review and challenge the collected data. Commercial Vehicle Administration Centers can share current program status and credential information with other Centers, so that it is possible for any Commercial Vehicle Administration Center to have access to all credentials, credential fees, credentials status and safety status information. In addition, it is possible for one Commercial Vehicle Administration Center to collect HAZMAT route restrictions information from other Commercial Vehicle Administration Centers and then act as a clearinghouse for this route restrictions information.	Existing	Local Public Safety Agencies
CVO12	HAZMAT Management	This service package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material transport, including response to incidents. HAZMAT tracking is performed by the Fleet and Freight Management Center. The Emergency Management Center is notified by the Commercial Vehicle and the Fleet and Freight Management Center of the HAZMAT vehicle location and information about the HAZMAT load. If an incident occurs, the Emergency Management Center can use the information to coordinate the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Center. The latter information can be provided prior to the beginning of the trip, during the trip, or gathered following the incident depending on the selected policy and implementation.	Existing	Commercial Vehicle Operators
CVO12	HAZMAT Management	This service package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material transport, including response to incidents. HAZMAT tracking is performed by the Fleet and Freight Management Center. The Emergency Management Center is notified by the Commercial Vehicle and the Fleet and Freight Management Center of the HAZMAT vehicle location and information about the HAZMAT load. If an incident occurs, the Emergency Management Center can use the information to coordinate the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Center. The latter information can be provided prior to the beginning of the trip, during the trip, or gathered following the incident depending on the selected policy and implementation.	Existing	Commercial Vehicles



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
CVO12	HAZMAT Management	This service package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material transport, including response to incidents. HAZMAT tracking is performed by the Fleet and Freight Management Center. The Emergency Management Center is notified by the Commercial Vehicle and the Fleet and Freight Management Center of the HAZMAT vehicle location and information about the HAZMAT load. If an incident occurs, the Emergency Management Center can use the information to coordinate the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Center. The latter information can be provided prior to the beginning of the trip, during the trip, or gathered following the incident depending on the selected policy and implementation.	Existing	Emergency 911 Centers
CVO12	HAZMAT Management	This service package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material transport, including response to incidents. HAZMAT tracking is performed by the Fleet and Freight Management Center. The Emergency Management Center is notified by the Commercial Vehicle and the Fleet and Freight Management Center of the HAZMAT vehicle location and information about the HAZMAT load. If an incident occurs, the Emergency Management Center can use the information to coordinate the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Center. The latter information can be provided prior to the beginning of the trip, during the trip, or gathered following the incident depending on the selected policy and implementation.	Existing	Emergency Services Functions
CVO12	HAZMAT Management	This service package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material transport, including response to incidents. HAZMAT tracking is performed by the Fleet and Freight Management Center. The Emergency Management Center is notified by the Commercial Vehicle and the Fleet and Freight Management Center of the HAZMAT vehicle location and information about the HAZMAT load. If an incident occurs, the Emergency Management Center can use the information to coordinate the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Center. The latter information can be provided prior to the beginning of the trip, during the trip, or gathered following the incident depending on the selected policy and implementation.	Existing	GOHSEP



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
CVO12	HAZMAT Management	This service package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material transport, including response to incidents. HAZMAT tracking is performed by the Fleet and Freight Management Center. The Emergency Management Center is notified by the Commercial Vehicle and the Fleet and Freight Management Center of the HAZMAT vehicle location and information about the HAZMAT load. If an incident occurs, the Emergency Management Center can use the information to coordinate the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Center. The latter information can be provided prior to the beginning of the trip, during the trip, or gathered following the incident depending on the selected policy and implementation.	Existing	HAZMAT Mobile Response
CVO12	HAZMAT Management	This service package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material transport, including response to incidents. HAZMAT tracking is performed by the Fleet and Freight Management Center. The Emergency Management Center is notified by the Commercial Vehicle and the Fleet and Freight Management Center of the HAZMAT vehicle location and information about the HAZMAT load. If an incident occurs, the Emergency Management Center can use the information to coordinate the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Center. The latter information can be provided prior to the beginning of the trip, during the trip, or gathered following the incident depending on the selected policy and implementation.	Existing	LADOTD District Traffic Operations
CVO12	HAZMAT Management	This service package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material transport, including response to incidents. HAZMAT tracking is performed by the Fleet and Freight Management Center. The Emergency Management Center is notified by the Commercial Vehicle and the Fleet and Freight Management Center of the HAZMAT vehicle location and information about the HAZMAT load. If an incident occurs, the Emergency Management Center can use the information to coordinate the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Center. The latter information can be provided prior to the beginning of the trip, during the trip, or gathered following the incident depending on the selected policy and implementation.	Existing	Local Emergency Services



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
CVO12	HAZMAT Management	This service package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material transport, including response to incidents. HAZMAT tracking is performed by the Fleet and Freight Management Center. The Emergency Management Center is notified by the Commercial Vehicle and the Fleet and Freight Management Center of the HAZMAT vehicle location and information about the HAZMAT load. If an incident occurs, the Emergency Management Center can use the information to coordinate the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Center. The latter information can be provided prior to the beginning of the trip, during the trip, or gathered following the incident depending on the selected policy and implementation.	Existing	Local Public Safety Agencies
CVO12	HAZMAT Management	This service package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material transport, including response to incidents. HAZMAT tracking is performed by the Fleet and Freight Management Center. The Emergency Management Center is notified by the Commercial Vehicle and the Fleet and Freight Management Center of the HAZMAT vehicle location and information about the HAZMAT load. If an incident occurs, the Emergency Management Center can use the information to coordinate the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Center. The latter information can be provided prior to the beginning of the trip, during the trip, or gathered following the incident depending on the selected policy and implementation.	Existing	TMC



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
CVO15	Fleet and Freight Security	This service package provides enhanced security for commercial vehicle fleets and freight. Internal and external alerts and advisories are monitored to identify potential threats to the safety and security of the fleet and freight. It provides for the planning and tracking of three aspects of commercial vehicle shipments. For each shipment, the commercial vehicle, the freight equipment, and the commercial vehicle driver are monitored for consistency with the planned assignment. Any unauthorized changes are determined by the Fleet and Freight Management Center and then the appropriate people and Centers are notified. As the freight is shipped and tracked, security and public safety agencies may also interrogate the freight container to determine if it has been breached and to identify container contents. Once a route has been assigned, changes must be coordinated. Commercial Vehicle Drivers are alerted to any changes in route from the planned route and given an opportunity to justify a rerouting. Any unauthorized or unexpected route changes by the Commercial Vehicle will register a route deviation alert with the Fleet and Freight Management Center, which can notify local public safety agencies of the route deviation when appropriate (e.g., if there is safety sensitive HAZMAT being carried). Freight managers may decide to take further action on the alerts and/or provide responses that explain that the alerts are false alarms. If no explanation is received, the Fleet and Freight Management Center may notify the Emergency Management Center.	Existing	Commercial Vehicle Operators
CVO15	Fleet and Freight Security	This service package provides enhanced security for commercial vehicle fleets and freight. Internal and external alerts and advisories are monitored to identify potential threats to the safety and security of the fleet and freight. It provides for the planning and tracking of three aspects of commercial vehicle shipments. For each shipment, the commercial vehicle, the freight equipment, and the commercial vehicle driver are monitored for consistency with the planned assignment. Any unauthorized changes are determined by the Fleet and Freight Management Center and then the appropriate people and Centers are notified. As the freight is shipped and tracked, security and public safety agencies may also interrogate the freight container to determine if it has been breached and to identify container contents. Once a route has been assigned, changes must be coordinated. Commercial Vehicle Drivers are alerted to any changes in route from the planned route and given an opportunity to justify a rerouting. Any unauthorized or unexpected route changes by the Commercial Vehicle will register a route deviation alert with the Fleet and Freight Management Center, which can notify local public safety agencies of the route deviation when appropriate (e.g., if there is safety sensitive HAZMAT being carried). Freight managers may decide to take further action on the alerts and/or provide responses that explain that the alerts are false alarms. If no explanation is received, the Fleet and Freight Management Center may notify the Emergency Management Center.	Existing	Commercial Vehicles



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
CVO15	Fleet and Freight Security	<p>This service package provides enhanced security for commercial vehicle fleets and freight. Internal and external alerts and advisories are monitored to identify potential threats to the safety and security of the fleet and freight. It provides for the planning and tracking of three aspects of commercial vehicle shipments. For each shipment, the commercial vehicle, the freight equipment, and the commercial vehicle driver are monitored for consistency with the planned assignment. Any unauthorized changes are determined by the Fleet and Freight Management Center and then the appropriate people and Centers are notified. As the freight is shipped and tracked, security and public safety agencies may also interrogate the freight container to determine if it has been breached and to identify container contents. Once a route has been assigned, changes must be coordinated. Commercial Vehicle Drivers are alerted to any changes in route from the planned route and given an opportunity to justify a rerouting. Any unauthorized or unexpected route changes by the Commercial Vehicle will register a route deviation alert with the Fleet and Freight Management Center, which can notify local public safety agencies of the route deviation when appropriate (e.g., if there is safety sensitive HAZMAT being carried). Freight managers may decide to take further action on the alerts and/or provide responses that explain that the alerts are false alarms. If no explanation is received, the Fleet and Freight Management Center may notify the Emergency Management Center.</p>	Existing	Local Public Safety Agencies
CVO15	Fleet and Freight Security	<p>This service package provides enhanced security for commercial vehicle fleets and freight. Internal and external alerts and advisories are monitored to identify potential threats to the safety and security of the fleet and freight. It provides for the planning and tracking of three aspects of commercial vehicle shipments. For each shipment, the commercial vehicle, the freight equipment, and the commercial vehicle driver are monitored for consistency with the planned assignment. Any unauthorized changes are determined by the Fleet and Freight Management Center and then the appropriate people and Centers are notified. As the freight is shipped and tracked, security and public safety agencies may also interrogate the freight container to determine if it has been breached and to identify container contents. Once a route has been assigned, changes must be coordinated. Commercial Vehicle Drivers are alerted to any changes in route from the planned route and given an opportunity to justify a rerouting. Any unauthorized or unexpected route changes by the Commercial Vehicle will register a route deviation alert with the Fleet and Freight Management Center, which can notify local public safety agencies of the route deviation when appropriate (e.g., if there is safety sensitive HAZMAT being carried). Freight managers may decide to take further action on the alerts and/or provide responses that explain that the alerts are false alarms. If no explanation is received, the Fleet and Freight Management Center may notify the Emergency Management Center.</p>	Existing	LSP



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
CVO15	Fleet and Freight Security	This service package provides enhanced security for commercial vehicle fleets and freight. Internal and external alerts and advisories are monitored to identify potential threats to the safety and security of the fleet and freight. It provides for the planning and tracking of three aspects of commercial vehicle shipments. For each shipment, the commercial vehicle, the freight equipment, and the commercial vehicle driver are monitored for consistency with the planned assignment. Any unauthorized changes are determined by the Fleet and Freight Management Center and then the appropriate people and Centers are notified. As the freight is shipped and tracked, security and public safety agencies may also interrogate the freight container to determine if it has been breached and to identify container contents. Once a route has been assigned, changes must be coordinated. Commercial Vehicle Drivers are alerted to any changes in route from the planned route and given an opportunity to justify a rerouting. Any unauthorized or unexpected route changes by the Commercial Vehicle will register a route deviation alert with the Fleet and Freight Management Center, which can notify local public safety agencies of the route deviation when appropriate (e.g., if there is safety sensitive HAZMAT being carried). Freight managers may decide to take further action on the alerts and/or provide responses that explain that the alerts are false alarms. If no explanation is received, the Fleet and Freight Management Center may notify the Emergency Management Center.	Existing	Ports
DM01	ITS Data Warehouse	This service package provides access to transportation data to support transportation planning, condition and performance monitoring, safety analysis, and research. Configurations range from focused repositories that house data collected and owned by a single agency, district, private sector provider, or research institution to broad repositories that contain multimodal, multidimensional data from varied data sources covering a broader region. Both central repositories and physical distributed ITS data repositories are supported. Requests for data that are satisfied by access to a single repository in the ITS Data Warehouse service package may be parsed by the local repository and dynamically translated to requests to other repositories that relay the data necessary to satisfy the request. The repositories could include a data registry capability that allows registration of data identifiers or data definitions for interoperable use throughout a region.	Existing	Commercial Vehicle Operators



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
DM01	ITS Data Warehouse	This service package provides access to transportation data to support transportation planning, condition and performance monitoring, safety analysis, and research. Configurations range from focused repositories that house data collected and owned by a single agency, district, private sector provider, or research institution to broad repositories that contain multimodal, multidimensional data from varied data sources covering a broader region. Both central repositories and physical distributed ITS data repositories are supported. Requests for data that are satisfied by access to a single repository in the ITS Data Warehouse service package may be parsed by the local repository and dynamically translated to requests to other repositories that relay the data necessary to satisfy the request. The repositories could include a data registry capability that allows registration of data identifiers or data definitions for interoperable use throughout a region.	Existing	CVO Inspection Stations
DM01	ITS Data Warehouse	This service package provides access to transportation data to support transportation planning, condition and performance monitoring, safety analysis, and research. Configurations range from focused repositories that house data collected and owned by a single agency, district, private sector provider, or research institution to broad repositories that contain multimodal, multidimensional data from varied data sources covering a broader region. Both central repositories and physical distributed ITS data repositories are supported. Requests for data that are satisfied by access to a single repository in the ITS Data Warehouse service package may be parsed by the local repository and dynamically translated to requests to other repositories that relay the data necessary to satisfy the request. The repositories could include a data registry capability that allows registration of data identifiers or data definitions for interoperable use throughout a region.	Existing	Emergency 911 Centers
DM01	ITS Data Warehouse	This service package provides access to transportation data to support transportation planning, condition and performance monitoring, safety analysis, and research. Configurations range from focused repositories that house data collected and owned by a single agency, district, private sector provider, or research institution to broad repositories that contain multimodal, multidimensional data from varied data sources covering a broader region. Both central repositories and physical distributed ITS data repositories are supported. Requests for data that are satisfied by access to a single repository in the ITS Data Warehouse service package may be parsed by the local repository and dynamically translated to requests to other repositories that relay the data necessary to satisfy the request. The repositories could include a data registry capability that allows registration of data identifiers or data definitions for interoperable use throughout a region.	Existing	GOHSEP



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DM01	ITS Data Warehouse	This service package provides access to transportation data to support transportation planning, condition and performance monitoring, safety analysis, and research. Configurations range from focused repositories that house data collected and owned by a single agency, district, private sector provider, or research institution to broad repositories that contain multimodal, multidimensional data from varied data sources covering a broader region. Both central repositories and physical distributed ITS data repositories are supported. Requests for data that are satisfied by access to a single repository in the ITS Data Warehouse service package may be parsed by the local repository and dynamically translated to requests to other repositories that relay the data necessary to satisfy the request. The repositories could include a data registry capability that allows registration of data identifiers or data definitions for interoperable use throughout a region.	Existing	LADOTD District Traffic Operations
DM01	ITS Data Warehouse	This service package provides access to transportation data to support transportation planning, condition and performance monitoring, safety analysis, and research. Configurations range from focused repositories that house data collected and owned by a single agency, district, private sector provider, or research institution to broad repositories that contain multimodal, multidimensional data from varied data sources covering a broader region. Both central repositories and physical distributed ITS data repositories are supported. Requests for data that are satisfied by access to a single repository in the ITS Data Warehouse service package may be parsed by the local repository and dynamically translated to requests to other repositories that relay the data necessary to satisfy the request. The repositories could include a data registry capability that allows registration of data identifiers or data definitions for interoperable use throughout a region.	Existing	LADOTD ITS Section 56
DM01	ITS Data Warehouse	This service package provides access to transportation data to support transportation planning, condition and performance monitoring, safety analysis, and research. Configurations range from focused repositories that house data collected and owned by a single agency, district, private sector provider, or research institution to broad repositories that contain multimodal, multidimensional data from varied data sources covering a broader region. Both central repositories and physical distributed ITS data repositories are supported. Requests for data that are satisfied by access to a single repository in the ITS Data Warehouse service package may be parsed by the local repository and dynamically translated to requests to other repositories that relay the data necessary to satisfy the request. The repositories could include a data registry capability that allows registration of data identifiers or data definitions for interoperable use throughout a region.	Existing	Local Planning Organizations



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
DM01	ITS Data Warehouse	This service package provides access to transportation data to support transportation planning, condition and performance monitoring, safety analysis, and research. Configurations range from focused repositories that house data collected and owned by a single agency, district, private sector provider, or research institution to broad repositories that contain multimodal, multidimensional data from varied data sources covering a broader region. Both central repositories and physical distributed ITS data repositories are supported. Requests for data that are satisfied by access to a single repository in the ITS Data Warehouse service package may be parsed by the local repository and dynamically translated to requests to other repositories that relay the data necessary to satisfy the request. The repositories could include a data registry capability that allows registration of data identifiers or data definitions for interoperable use throughout a region.	Existing	TMC
MC05	Roadway Maintenance and Construction	This service package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way. Maintenance services include landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, CCTV, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling maintenance and construction activities.	Planned	LADOTD District
MC06	Work Zone Management	This service package manages work zones, controlling traffic in areas of the roadway where maintenance, construction, and utility work activities are underway. Traffic conditions are monitored using CCTV cameras and controlled using dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers. Work zone information is coordinated with other groups (e.g., TIC, traffic management, other maintenance and construction centers). Work zone speeds and delays are provided to the motorist prior to the work zones. This service package provides control of field equipment in all maintenance and construction areas, including fixed, portable, and truck-mounted devices supporting both stationary and mobile work zones.	Existing	LADOTD District Traffic Operations
MC06	Work Zone Management	This service package manages work zones, controlling traffic in areas of the roadway where maintenance, construction, and utility work activities are underway. Traffic conditions are monitored using CCTV cameras and controlled using dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers. Work zone information is coordinated with other groups (e.g., TIC, traffic management, other maintenance and construction centers). Work zone speeds and delays are provided to the motorist prior to the work zones. This service package provides control of field equipment in all maintenance and construction areas, including fixed, portable, and truck-mounted devices supporting both stationary and mobile work zones.	Existing	Local DPW



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
MC06	Work Zone Management	This service package manages work zones, controlling traffic in areas of the roadway where maintenance, construction, and utility work activities are underway. Traffic conditions are monitored using CCTV cameras and controlled using dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers. Work zone information is coordinated with other groups (e.g., TIC, traffic management, other maintenance and construction centers). Work zone speeds and delays are provided to the motorist prior to the work zones. This service package provides control of field equipment in all maintenance and construction areas, including fixed, portable, and truck-mounted devices supporting both stationary and mobile work zones.	Existing	Louisiana Website 511
MC06	Work Zone Management	This service package manages work zones, controlling traffic in areas of the roadway where maintenance, construction, and utility work activities are underway. Traffic conditions are monitored using CCTV cameras and controlled using dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers. Work zone information is coordinated with other groups (e.g., TIC, traffic management, other maintenance and construction centers). Work zone speeds and delays are provided to the motorist prior to the work zones. This service package provides control of field equipment in all maintenance and construction areas, including fixed, portable, and truck-mounted devices supporting both stationary and mobile work zones.	Existing	Media
MC06	Work Zone Management	This service package manages work zones, controlling traffic in areas of the roadway where maintenance, construction, and utility work activities are underway. Traffic conditions are monitored using CCTV cameras and controlled using dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers. Work zone information is coordinated with other groups (e.g., TIC, traffic management, other maintenance and construction centers). Work zone speeds and delays are provided to the motorist prior to the work zones. This service package provides control of field equipment in all maintenance and construction areas, including fixed, portable, and truck-mounted devices supporting both stationary and mobile work zones.	Existing	TMC
MC07	Work Zone Safety Monitoring	This service package provides warnings to maintenance personnel within a work zone about potential hazards within the work zone. It enables vehicles or the infrastructure to provide warnings to workers in a work zone when a vehicle is moving in a manner that appears to create an unsafe condition (e.g., moving at high speed or entering the work zone).	Planned	ITS Field Equipment
MC07	Work Zone Safety Monitoring	This service package provides warnings to maintenance personnel within a work zone about potential hazards within the work zone. It enables vehicles or the infrastructure to provide warnings to workers in a work zone when a vehicle is moving in a manner that appears to create an unsafe condition (e.g., moving at high speed or entering the work zone).	Planned	LADOTD District Traffic Operations



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
MC07	Work Zone Safety Monitoring	This service package provides warnings to maintenance personnel within a work zone about potential hazards within the work zone. It enables vehicles or the infrastructure to provide warnings to workers in a work zone when a vehicle is moving in a manner that appears to create an unsafe condition (e.g., moving at high speed or entering the work zone).	Planned	Workzone ITS
MC08	Maintenance and Construction Activity Coordination	This service package supports the dissemination of maintenance and construction activity to centers that can utilize it as part of their operations, or to Transportation Information Centers who can provide the information to travelers. Center to center coordination of work plans supports adjustments to reduce disruption to regional transportation operations.	Existing	LADOTD District Traffic Operations
MC08	Maintenance and Construction Activity Coordination	This service package supports the dissemination of maintenance and construction activity to centers that can utilize it as part of their operations, or to Transportation Information Centers who can provide the information to travelers. Center to center coordination of work plans supports adjustments to reduce disruption to regional transportation operations.	Existing	Local DPW
MC08	Maintenance and Construction Activity Coordination	This service package supports the dissemination of maintenance and construction activity to centers that can utilize it as part of their operations, or to Transportation Information Centers who can provide the information to travelers. Center to center coordination of work plans supports adjustments to reduce disruption to regional transportation operations.	Existing	TMC
MC09	Infrastructure Monitoring	This service package monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts) using both fixed and vehicle-based infrastructure monitoring sensors. Fixed sensors monitor vibration, stress, temperature, continuity, and other parameters and mobile sensors and data logging devices collect information on current infrastructure condition. This service package also monitors vehicle probes for vertical acceleration data and other probe data that may be used to determine current pavement condition.	Existing	ITS Field Equipment
MC09	Infrastructure Monitoring	This service package monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts) using both fixed and vehicle-based infrastructure monitoring sensors. Fixed sensors monitor vibration, stress, temperature, continuity, and other parameters and mobile sensors and data logging devices collect information on current infrastructure condition. This service package also monitors vehicle probes for vertical acceleration data and other probe data that may be used to determine current pavement condition.	Existing	LADOTD District Traffic Operations



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
MC09	Infrastructure Monitoring	This service package monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts) using both fixed and vehicle-based infrastructure monitoring sensors. Fixed sensors monitor vibration, stress, temperature, continuity, and other parameters and mobile sensors and data logging devices collect information on current infrastructure condition. This service package also monitors vehicle probes for vertical acceleration data and other probe data that may be used to determine current pavement condition.	Existing	LADOTD Section 56 ITS
MC09	Infrastructure Monitoring	This service package monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts) using both fixed and vehicle-based infrastructure monitoring sensors. Fixed sensors monitor vibration, stress, temperature, continuity, and other parameters and mobile sensors and data logging devices collect information on current infrastructure condition. This service package also monitors vehicle probes for vertical acceleration data and other probe data that may be used to determine current pavement condition.	Existing	TMC
PS01	Emergency Call-Taking and Dispatch	This service package provides basic public safety call-taking and dispatch services. It includes emergency vehicle equipment, equipment used to receive and route emergency calls, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. Coordination between Emergency Management Centers supports emergency notification between agencies. Wide area wireless communications between the Emergency Management Center and an Emergency Vehicle supports dispatch and provision of information to responding personnel. This service package also provides information to support dynamic routing of emergency vehicles. Traffic information, road conditions, and weather advisories are provided to enhance emergency vehicle routing. The Emergency Management Center provides routing information based on real-time conditions and has the option to request an ingress/egress route from the Traffic Management Center.	Existing	Emergency Centers 911
PS01	Emergency Call-Taking and Dispatch	This service package provides basic public safety call-taking and dispatch services. It includes emergency vehicle equipment, equipment used to receive and route emergency calls, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. Coordination between Emergency Management Centers supports emergency notification between agencies. Wide area wireless communications between the Emergency Management Center and an Emergency Vehicle supports dispatch and provision of information to responding personnel. This service package also provides information to support dynamic routing of emergency vehicles. Traffic information, road conditions, and weather advisories are provided to enhance emergency vehicle routing. The Emergency Management Center provides routing information based on real-time conditions and has the option to request an ingress/egress route from the Traffic Management Center.	Existing	Local Public Safety Agencies



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
PS01	Emergency Call-Taking and Dispatch	This service package provides basic public safety call-taking and dispatch services. It includes emergency vehicle equipment, equipment used to receive and route emergency calls, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. Coordination between Emergency Management Centers supports emergency notification between agencies. Wide area wireless communications between the Emergency Management Center and an Emergency Vehicle supports dispatch and provision of information to responding personnel. This service package also provides information to support dynamic routing of emergency vehicles. Traffic information, road conditions, and weather advisories are provided to enhance emergency vehicle routing. The Emergency Management Center provides routing information based on real-time conditions and has the option to request an ingress/egress route from the Traffic Management Center.	Existing	TMC
PS02	Emergency Response	This service package supports emergency/ incident response by personnel in the field. It includes emergency vehicle equipment used to provide response status as well as video or images from either the vehicle or from emergency personnel in the field. Wide area wireless communications between the Emergency Management Center, Emergency Personnel and Emergency Vehicles supports a sharing of emergency response information. The service package also includes tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident, including the functions and interfaces commonly supported by a mobile command center.	Existing	Emergency 911 Centers
PS02	Emergency Response	This service package supports emergency/ incident response by personnel in the field. It includes emergency vehicle equipment used to provide response status as well as video or images from either the vehicle or from emergency personnel in the field. Wide area wireless communications between the Emergency Management Center, Emergency Personnel and Emergency Vehicles supports a sharing of emergency response information. The service package also includes tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident, including the functions and interfaces commonly supported by a mobile command center.	Existing	Emergency Services Functions



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
PS02	Emergency Response	This service package supports emergency/ incident response by personnel in the field. It includes emergency vehicle equipment used to provide response status as well as video or images from either the vehicle or from emergency personnel in the field. Wide area wireless communications between the Emergency Management Center, Emergency Personnel and Emergency Vehicles supports a sharing of emergency response information. The service package also includes tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident, including the functions and interfaces commonly supported by a mobile command center.	Existing	HAZMAT Mobile Response
PS02	Emergency Response	This service package supports emergency/ incident response by personnel in the field. It includes emergency vehicle equipment used to provide response status as well as video or images from either the vehicle or from emergency personnel in the field. Wide area wireless communications between the Emergency Management Center, Emergency Personnel and Emergency Vehicles supports a sharing of emergency response information. The service package also includes tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident, including the functions and interfaces commonly supported by a mobile command center.	Existing	LADOTD District Traffic Operations
PS02	Emergency Response	This service package supports emergency/ incident response by personnel in the field. It includes emergency vehicle equipment used to provide response status as well as video or images from either the vehicle or from emergency personnel in the field. Wide area wireless communications between the Emergency Management Center, Emergency Personnel and Emergency Vehicles supports a sharing of emergency response information. The service package also includes tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident, including the functions and interfaces commonly supported by a mobile command center.	Existing	Local Emergency Services
PS02	Emergency Response	This service package supports emergency/ incident response by personnel in the field. It includes emergency vehicle equipment used to provide response status as well as video or images from either the vehicle or from emergency personnel in the field. Wide area wireless communications between the Emergency Management Center, Emergency Personnel and Emergency Vehicles supports a sharing of emergency response information. The service package also includes tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident, including the functions and interfaces commonly supported by a mobile command center.	Existing	Local Public Safety Agencies



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
PS02	Emergency Response	This service package supports emergency/ incident response by personnel in the field. It includes emergency vehicle equipment used to provide response status as well as video or images from either the vehicle or from emergency personnel in the field. Wide area wireless communications between the Emergency Management Center, Emergency Personnel and Emergency Vehicles supports a sharing of emergency response information. The service package also includes tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident, including the functions and interfaces commonly supported by a mobile command center.	Existing	LSP
PS02	Emergency Response	This service package supports emergency/ incident response by personnel in the field. It includes emergency vehicle equipment used to provide response status as well as video or images from either the vehicle or from emergency personnel in the field. Wide area wireless communications between the Emergency Management Center, Emergency Personnel and Emergency Vehicles supports a sharing of emergency response information. The service package also includes tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident, including the functions and interfaces commonly supported by a mobile command center.	Existing	TMC
PS03	Emergency Vehicle Preemption	This service package provides signal preemption for public safety first responder vehicles. Both traditional signal preemption systems and new systems based on connected vehicle technology are covered. In more advanced systems, movement of public safety vehicles through the intersection can be facilitated by clearing queues and holding conflicting phases. In addition, this SP also covers the transition back to normal traffic signal operations after providing emergency vehicle preemption.	Existing	Emergency 911 Centers
PS03	Emergency Vehicle Preemption	This service package provides signal preemption for public safety first responder vehicles. Both traditional signal preemption systems and new systems based on connected vehicle technology are covered. In more advanced systems, movement of public safety vehicles through the intersection can be facilitated by clearing queues and holding conflicting phases. In addition, this SP also covers the transition back to normal traffic signal operations after providing emergency vehicle preemption.	Existing	TMC
PS08	Roadway Service Patrols	This service package supports roadway service patrol vehicles that monitor roads and aid motorists, offering rapid response to minor incidents (flat tire, accidents, out of gas) to minimize disruption to the traffic stream. If problems are detected, the roadway service patrol vehicles will provide assistance to the motorist (e.g., push a vehicle to the shoulder or median). The service package monitors service patrol vehicle locations and supports vehicle dispatch to identified incident locations. Incident information collected by the service patrol is shared with traffic, maintenance and construction, and traveler information systems.	Planned	Emergency 911 Centers



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
PS08	Roadway Service Patrols	This service package supports roadway service patrol vehicles that monitor roads and aid motorists, offering rapid response to minor incidents (flat tire, accidents, out of gas) to minimize disruption to the traffic stream. If problems are detected, the roadway service patrol vehicles will provide assistance to the motorist (e.g., push a vehicle to the shoulder or median). The service package monitors service patrol vehicle locations and supports vehicle dispatch to identified incident locations. Incident information collected by the service patrol is shared with traffic, maintenance and construction, and traveler information systems.	Planned	LADOTD District Traffic Operations
PS08	Roadway Service Patrols	This service package supports roadway service patrol vehicles that monitor roads and aid motorists, offering rapid response to minor incidents (flat tire, accidents, out of gas) to minimize disruption to the traffic stream. If problems are detected, the roadway service patrol vehicles will provide assistance to the motorist (e.g., push a vehicle to the shoulder or median). The service package monitors service patrol vehicle locations and supports vehicle dispatch to identified incident locations. Incident information collected by the service patrol is shared with traffic, maintenance and construction, and traveler information systems.	Planned	TMC
PS09	Transportation Infrastructure Protection	This service package includes the monitoring of transportation infrastructure (e.g., bridges, tunnels and management centers) for potential threats using sensors and surveillance equipment and barrier and safeguard systems to control access, preclude an incident, and mitigate the impact of an incident if it occurs. Threats can result from acts of nature (e.g., hurricanes, earthquakes), terrorist attacks or other incidents causing damage to the infrastructure (e.g., stray barge hitting a bridge support). Infrastructure may be monitored with acoustic, environmental threat (such as nuclear, biological, chemical, and explosives), infrastructure condition and integrity, motion and object sensors and video and audio surveillance equipment. Data from such sensors and surveillance equipment may be processed in the field or sent to a center for processing. The data enables operators at the center to detect and verify threats. When a threat is detected, agencies are notified. Detected threats or advisories received from other agencies result in an increased level of system preparedness. In response to threats, barrier and safeguard systems may be activated to deter an incident, control access to an area or mitigate the impact of an incident. Barrier systems include gates, barriers and other automated and remotely controlled systems that manage entry to transportation infrastructure. Safeguard systems include blast shields, exhaust systems and other automated and remotely controlled systems that mitigate impact of an incident.	Planned	Emergency 911 Centers



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
PS09	Transportation Infrastructure Protection	This service package includes the monitoring of transportation infrastructure (e.g., bridges, tunnels and management centers) for potential threats using sensors and surveillance equipment and barrier and safeguard systems to control access, preclude an incident, and mitigate the impact of an incident if it occurs. Threats can result from acts of nature (e.g., hurricanes, earthquakes), terrorist attacks or other incidents causing damage to the infrastructure (e.g., stray barge hitting a bridge support). Infrastructure may be monitored with acoustic, environmental threat (such as nuclear, biological, chemical, and explosives), infrastructure condition and integrity, motion and object sensors and video and audio surveillance equipment. Data from such sensors and surveillance equipment may be processed in the field or sent to a center for processing. The data enables operators at the center to detect and verify threats. When a threat is detected, agencies are notified. Detected threats or advisories received from other agencies result in an increased level of system preparedness. In response to threats, barrier and safeguard systems may be activated to deter an incident, control access to an area or mitigate the impact of an incident. Barrier systems include gates, barriers and other automated and remotely controlled systems that manage entry to transportation infrastructure. Safeguard systems include blast shields, exhaust systems and other automated and remotely controlled systems that mitigate impact of an incident.	Planned	Emergency Services Functions
PS09	Transportation Infrastructure Protection	This service package includes the monitoring of transportation infrastructure (e.g., bridges, tunnels and management centers) for potential threats using sensors and surveillance equipment and barrier and safeguard systems to control access, preclude an incident, and mitigate the impact of an incident if it occurs. Threats can result from acts of nature (e.g., hurricanes, earthquakes), terrorist attacks or other incidents causing damage to the infrastructure (e.g., stray barge hitting a bridge support). Infrastructure may be monitored with acoustic, environmental threat (such as nuclear, biological, chemical, and explosives), infrastructure condition and integrity, motion and object sensors and video and audio surveillance equipment. Data from such sensors and surveillance equipment may be processed in the field or sent to a center for processing. The data enables operators at the center to detect and verify threats. When a threat is detected, agencies are notified. Detected threats or advisories received from other agencies result in an increased level of system preparedness. In response to threats, barrier and safeguard systems may be activated to deter an incident, control access to an area or mitigate the impact of an incident. Barrier systems include gates, barriers and other automated and remotely controlled systems that manage entry to transportation infrastructure. Safeguard systems include blast shields, exhaust systems and other automated and remotely controlled systems that mitigate impact of an incident.	Planned	ITS Field Equipment



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PS09	Transportation Infrastructure Protection	This service package includes the monitoring of transportation infrastructure (e.g., bridges, tunnels and management centers) for potential threats using sensors and surveillance equipment and barrier and safeguard systems to control access, preclude an incident, and mitigate the impact of an incident if it occurs. Threats can result from acts of nature (e.g., hurricanes, earthquakes), terrorist attacks or other incidents causing damage to the infrastructure (e.g., stray barge hitting a bridge support). Infrastructure may be monitored with acoustic, environmental threat (such as nuclear, biological, chemical, and explosives), infrastructure condition and integrity, motion and object sensors and video and audio surveillance equipment. Data from such sensors and surveillance equipment may be processed in the field or sent to a center for processing. The data enables operators at the center to detect and verify threats. When a threat is detected, agencies are notified. Detected threats or advisories received from other agencies result in an increased level of system preparedness. In response to threats, barrier and safeguard systems may be activated to deter an incident, control access to an area or mitigate the impact of an incident. Barrier systems include gates, barriers and other automated and remotely controlled systems that manage entry to transportation infrastructure. Safeguard systems include blast shields, exhaust systems and other automated and remotely controlled systems that mitigate impact of an incident.	Planned	LADOTD District Traffic Operations
PS09	Transportation Infrastructure Protection	This service package includes the monitoring of transportation infrastructure (e.g., bridges, tunnels and management centers) for potential threats using sensors and surveillance equipment and barrier and safeguard systems to control access, preclude an incident, and mitigate the impact of an incident if it occurs. Threats can result from acts of nature (e.g., hurricanes, earthquakes), terrorist attacks or other incidents causing damage to the infrastructure (e.g., stray barge hitting a bridge support). Infrastructure may be monitored with acoustic, environmental threat (such as nuclear, biological, chemical, and explosives), infrastructure condition and integrity, motion and object sensors and video and audio surveillance equipment. Data from such sensors and surveillance equipment may be processed in the field or sent to a center for processing. The data enables operators at the center to detect and verify threats. When a threat is detected, agencies are notified. Detected threats or advisories received from other agencies result in an increased level of system preparedness. In response to threats, barrier and safeguard systems may be activated to deter an incident, control access to an area or mitigate the impact of an incident. Barrier systems include gates, barriers and other automated and remotely controlled systems that manage entry to transportation infrastructure. Safeguard systems include blast shields, exhaust systems and other automated and remotely controlled systems that mitigate impact of an incident.	Planned	Local Public Safety Agencies



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
PS09	Transportation Infrastructure Protection	This service package includes the monitoring of transportation infrastructure (e.g., bridges, tunnels and management centers) for potential threats using sensors and surveillance equipment and barrier and safeguard systems to control access, preclude an incident, and mitigate the impact of an incident if it occurs. Threats can result from acts of nature (e.g., hurricanes, earthquakes), terrorist attacks or other incidents causing damage to the infrastructure (e.g., stray barge hitting a bridge support). Infrastructure may be monitored with acoustic, environmental threat (such as nuclear, biological, chemical, and explosives), infrastructure condition and integrity, motion and object sensors and video and audio surveillance equipment. Data from such sensors and surveillance equipment may be processed in the field or sent to a center for processing. The data enables operators at the center to detect and verify threats. When a threat is detected, agencies are notified. Detected threats or advisories received from other agencies result in an increased level of system preparedness. In response to threats, barrier and safeguard systems may be activated to deter an incident, control access to an area or mitigate the impact of an incident. Barrier systems include gates, barriers and other automated and remotely controlled systems that manage entry to transportation infrastructure. Safeguard systems include blast shields, exhaust systems and other automated and remotely controlled systems that mitigate impact of an incident.	Planned	LSP
PS10	Wide-Area Alert	This service package uses ITS driver and traveler information systems to alert the public in emergency situations such as child abductions, severe weather events, civil emergencies, and other situations that pose a threat to life and property. The alert includes information and instructions for transportation system operators and the traveling public, improving public safety and enlisting the public's help in some scenarios. The ITS technologies will supplement and support other emergency and homeland security alert systems such as the Emergency Alert System (EAS). When an emergency situation is reported and verified and the terms and conditions for system activation are satisfied, a designated agency broadcasts emergency information to traffic agencies, transit agencies, information service providers, toll operators, and others that operate ITS systems. The ITS systems, in turn, provide the alert information to transportation system operators and the traveling public using ITS technologies such as dynamic message signs, highway advisory radios, in-vehicle displays, transit displays, 511 traveler information systems, and traveler information websites.	Existing	Emergency 911 Centers



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PS10	Wide-Area Alert	This service package uses ITS driver and traveler information systems to alert the public in emergency situations such as child abductions, severe weather events, civil emergencies, and other situations that pose a threat to life and property. The alert includes information and instructions for transportation system operators and the traveling public, improving public safety and enlisting the public's help in some scenarios. The ITS technologies will supplement and support other emergency and homeland security alert systems such as the Emergency Alert System (EAS). When an emergency situation is reported and verified and the terms and conditions for system activation are satisfied, a designated agency broadcasts emergency information to traffic agencies, transit agencies, information service providers, toll operators, and others that operate ITS systems. The ITS systems, in turn, provide the alert information to transportation system operators and the traveling public using ITS technologies such as dynamic message signs, highway advisory radios, in-vehicle displays, transit displays, 511 traveler information systems, and traveler information websites.	Existing	Local Public Safety Agencies
PS10	Wide-Area Alert	This service package uses ITS driver and traveler information systems to alert the public in emergency situations such as child abductions, severe weather events, civil emergencies, and other situations that pose a threat to life and property. The alert includes information and instructions for transportation system operators and the traveling public, improving public safety and enlisting the public's help in some scenarios. The ITS technologies will supplement and support other emergency and homeland security alert systems such as the Emergency Alert System (EAS). When an emergency situation is reported and verified and the terms and conditions for system activation are satisfied, a designated agency broadcasts emergency information to traffic agencies, transit agencies, information service providers, toll operators, and others that operate ITS systems. The ITS systems, in turn, provide the alert information to transportation system operators and the traveling public using ITS technologies such as dynamic message signs, highway advisory radios, in-vehicle displays, transit displays, 511 traveler information systems, and traveler information websites.	Existing	Louisiana Website 511



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PS10	Wide-Area Alert	<p>This service package uses ITS driver and traveler information systems to alert the public in emergency situations such as child abductions, severe weather events, civil emergencies, and other situations that pose a threat to life and property. The alert includes information and instructions for transportation system operators and the traveling public, improving public safety and enlisting the public's help in some scenarios. The ITS technologies will supplement and support other emergency and homeland security alert systems such as the Emergency Alert System (EAS). When an emergency situation is reported and verified and the terms and conditions for system activation are satisfied, a designated agency broadcasts emergency information to traffic agencies, transit agencies, information service providers, toll operators, and others that operate ITS systems. The ITS systems, in turn, provide the alert information to transportation system operators and the traveling public using ITS technologies such as dynamic message signs, highway advisory radios, in-vehicle displays, transit displays, 511 traveler information systems, and traveler information websites.</p>	Existing	Personal Devices
PS10	Wide-Area Alert	<p>This service package uses ITS driver and traveler information systems to alert the public in emergency situations such as child abductions, severe weather events, civil emergencies, and other situations that pose a threat to life and property. The alert includes information and instructions for transportation system operators and the traveling public, improving public safety and enlisting the public's help in some scenarios. The ITS technologies will supplement and support other emergency and homeland security alert systems such as the Emergency Alert System (EAS). When an emergency situation is reported and verified and the terms and conditions for system activation are satisfied, a designated agency broadcasts emergency information to traffic agencies, transit agencies, information service providers, toll operators, and others that operate ITS systems. The ITS systems, in turn, provide the alert information to transportation system operators and the traveling public using ITS technologies such as dynamic message signs, highway advisory radios, in-vehicle displays, transit displays, 511 traveler information systems, and traveler information websites.</p>	Existing	Public



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PS10	Wide-Area Alert	This service package uses ITS driver and traveler information systems to alert the public in emergency situations such as child abductions, severe weather events, civil emergencies, and other situations that pose a threat to life and property. The alert includes information and instructions for transportation system operators and the traveling public, improving public safety and enlisting the public's help in some scenarios. The ITS technologies will supplement and support other emergency and homeland security alert systems such as the Emergency Alert System (EAS). When an emergency situation is reported and verified and the terms and conditions for system activation are satisfied, a designated agency broadcasts emergency information to traffic agencies, transit agencies, information service providers, toll operators, and others that operate ITS systems. The ITS systems, in turn, provide the alert information to transportation system operators and the traveling public using ITS technologies such as dynamic message signs, highway advisory radios, in-vehicle displays, transit displays, 511 traveler information systems, and traveler information websites.	Existing	TMC
PS11	Early Warning System	This service package monitors and detects potential, looming, and actual disasters including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents, nuclear power plant accidents, and acts of terrorism including nuclear, chemical, biological, and radiological weapons attacks). The service package monitors alerting and advisory systems, ITS sensors and surveillance systems, field reports, and emergency call-taking systems to identify emergencies and notifies all responding agencies of detected emergencies.	Existing	Emergency Centers 911
PS11	Early Warning System	This service package monitors and detects potential, looming, and actual disasters including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents, nuclear power plant accidents, and acts of terrorism including nuclear, chemical, biological, and radiological weapons attacks). The service package monitors alerting and advisory systems, ITS sensors and surveillance systems, field reports, and emergency call-taking systems to identify emergencies and notifies all responding agencies of detected emergencies.	Existing	Emergency Services Functions
PS11	Early Warning System	This service package monitors and detects potential, looming, and actual disasters including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents, nuclear power plant accidents, and acts of terrorism including nuclear, chemical, biological, and radiological weapons attacks). The service package monitors alerting and advisory systems, ITS sensors and surveillance systems, field reports, and emergency call-taking systems to identify emergencies and notifies all responding agencies of detected emergencies.	Existing	GOHSEP



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PS11	Early Warning System	This service package monitors and detects potential, looming, and actual disasters including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents, nuclear power plant accidents, and acts of terrorism including nuclear, chemical, biological, and radiological weapons attacks). The service package monitors alerting and advisory systems, ITS sensors and surveillance systems, field reports, and emergency call-taking systems to identify emergencies and notifies all responding agencies of detected emergencies.	Existing	LSP



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PS12	Disaster Response and Recovery	<p>This service package enhances the ability of the surface transportation system to respond to and recover from disasters. It addresses the most severe incidents that require an extraordinary response from outside the local community. All types of disasters are addressed including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents, nuclear power plant accidents, and national security emergencies such as nuclear, chemical, biological, and radiological weapons attacks).The service package supports coordination of emergency response plans, including general plans developed before a disaster as well as specific tactical plans with short time horizon that are developed as part of a disaster response. The service package provides enhanced access to the scene for response personnel and resources, provides better information about the transportation system in the vicinity of the disaster, and maintains situation awareness regarding the disaster itself. In addition, this service package tracks and coordinates the transportation resources - the transportation professionals, equipment, and materials - that constitute a portion of the disaster response.The service package identifies the key points of integration between transportation systems and the public safety, emergency management, public health, and other allied organizations that form the overall disaster response. In this service package, the Emergency Management Center represents the federal, regional, state, and local Emergency Operations Centers and the Incident Commands that are established to respond to the disaster. The interface between the Emergency Management Center and the other centers provides situation awareness and resource coordination among transportation and other allied response agencies. In its role, traffic management implements special traffic control strategies and detours and restrictions to effectively manage traffic in and around the disaster. Maintenance and construction provides damage assessment of road network facilities and manages service restoration. Transit management provides a similar assessment of status for transit facilities and modifies transit operations to meet the special demands of the disaster. As immediate public safety concerns are addressed and disaster response transitions into recovery, this service package supports transition back to normal transportation system operation, recovering resources, managing on-going transportation facility repair, supporting data collection and revised plan coordination, and other recovery activities. This service package builds on the basic traffic incident response service that is provided by TM08, the Traffic Incident Management service package. This service package addresses the additional complexities and coordination requirements that are associated with the most severe incidents that warrant an extraordinary response from outside the local jurisdictions and require special measures such as the activation of one or more emergency operations centers. Many users of ARC-IT will want to consider both TM08 and this service package since every region is concerned with both day-to-day management of traffic-related incidents and occasional management of disasters that require extraordinary response.Disaster Response and Recovery is also supported by PS14, the</p>	Existing	Emergency 911 Centers



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		"Disaster Traveler Information" service package that keeps the public informed during a disaster response. See that service package for more information.		



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		"Disaster Traveler Information" service package that keeps the public informed during a disaster response. See that service package for more information.		



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		"Disaster Traveler Information" service package that keeps the public informed during a disaster response. See that service package for more information.		



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		"Disaster Traveler Information" service package that keeps the public informed during a disaster response. See that service package for more information.		
PS13	Evacuation and Reentry Management	This service package supports evacuation of the general public from a disaster area and manages subsequent reentry to the disaster area. The service package addresses evacuations for all types of disasters, including disasters like hurricanes that are anticipated and occur slowly, allowing a well-planned orderly evacuation, as well as disasters like terrorist acts that occur rapidly, without warning, and allow little or no time for preparation or public warning. This service package supports coordination of evacuation plans among the federal, state, and local transportation, emergency, and law enforcement agencies that may be involved in a large-scale evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan. Information is shared with traffic management agencies to implement special traffic control strategies and to control evacuation traffic, including traffic on local streets and arterials as well as the major evacuation routes. Reversible lanes, shoulder use, closures, special signal control strategies, and other special strategies may be implemented to maximize capacity along the evacuation routes. Transit resources play an important role in an evacuation, removing many people from an evacuated area while making efficient use of limited capacity. Additional shared transit resources may be added and managed in evacuation scenarios. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times. Evacuations are also supported by PS14, the "Disaster Traveler Information" service package, which keeps the public informed during evacuations. See that service package for more information.	Existing	GOHSEP



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PS13	Evacuation and Reentry Management	<p>This service package supports evacuation of the general public from a disaster area and manages subsequent reentry to the disaster area. The service package addresses evacuations for all types of disasters, including disasters like hurricanes that are anticipated and occur slowly, allowing a well-planned orderly evacuation, as well as disasters like terrorist acts that occur rapidly, without warning, and allow little or no time for preparation or public warning. This service package supports coordination of evacuation plans among the federal, state, and local transportation, emergency, and law enforcement agencies that may be involved in a large-scale evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan. Information is shared with traffic management agencies to implement special traffic control strategies and to control evacuation traffic, including traffic on local streets and arterials as well as the major evacuation routes. Reversible lanes, shoulder use, closures, special signal control strategies, and other special strategies may be implemented to maximize capacity along the evacuation routes. Transit resources play an important role in an evacuation, removing many people from an evacuated area while making efficient use of limited capacity. Additional shared transit resources may be added and managed in evacuation scenarios. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times. Evacuations are also supported by PS14, the "Disaster Traveler Information" service package, which keeps the public informed during evacuations. See that service package for more information.</p>	Existing	LADOTD Section 56 ITS



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PS13	Evacuation and Reentry Management	<p>This service package supports evacuation of the general public from a disaster area and manages subsequent reentry to the disaster area. The service package addresses evacuations for all types of disasters, including disasters like hurricanes that are anticipated and occur slowly, allowing a well-planned orderly evacuation, as well as disasters like terrorist acts that occur rapidly, without warning, and allow little or no time for preparation or public warning. This service package supports coordination of evacuation plans among the federal, state, and local transportation, emergency, and law enforcement agencies that may be involved in a large-scale evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan. Information is shared with traffic management agencies to implement special traffic control strategies and to control evacuation traffic, including traffic on local streets and arterials as well as the major evacuation routes. Reversible lanes, shoulder use, closures, special signal control strategies, and other special strategies may be implemented to maximize capacity along the evacuation routes. Transit resources play an important role in an evacuation, removing many people from an evacuated area while making efficient use of limited capacity. Additional shared transit resources may be added and managed in evacuation scenarios. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times. Evacuations are also supported by PS14, the "Disaster Traveler Information" service package, which keeps the public informed during evacuations. See that service package for more information.</p>	Existing	LADOTD Social Media



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PT01	Transit Vehicle Tracking	This service package monitors current transit vehicle location using an Automated Vehicle Location System. The location data may be used to determine real time schedule adherence and update the transit system's schedule in real-time.	Existing	Public Services Transit
PT02	Transit Fixed-Route Operations	This service package performs automated dispatch and system monitoring for fixed-route and flexible-route transit services. This service performs scheduling activities including the creation of schedules, blocks and runs, as well as operator assignment. This service monitors the transit vehicle trip performance against the schedule and provides information displays at the Transit Management Center.	Existing	Public Services Transit



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PT03	Dynamic Transit Operations	The Dynamic Transit Operations service package allows travelers to request trips and obtain itineraries using a personal device such as a smart phone, tablet, or personal computer. The trips and itineraries cover multiple transportation services (public transportation modes, private transportation services, shared-ride, walking and biking). This service package builds on existing technology systems such as computer-aided dispatch/ automated vehicle location (CAD/AVL) systems and automated scheduling software, providing a coordination function within and between transit providers that would dynamically schedule and dispatch or modify the route of an in-service vehicle by matching compatible trips together. TI06 covers other shared use transportation options.	Existing	Public Services Transit
PT04	Transit Fare Collection Management	This service package manages transit fare collection on-board transit vehicles and at transit stops using electronic means. It allows transit users to use a traveler card or other electronic payment device such as a smart phone. Readers located either in the infrastructure or on-board the transit vehicles enable electronic fare payment. Data is processed, stored, and displayed on the transit vehicle and communicated as needed to the Transit Management Center. This service supports ad-hoc payments to the transport provider (typically through the 'payment' and 'fare' flows), payments using a transport provider's account system using account-based tokens or integrated multi-provider account systems (typically through the 'account', 'secureID' and 'authorization' flows).	Existing	Public Services Transit
PT05	Transit Security	This service package provides for the physical security of transit passengers and transit vehicle operators. On-board equipment performs surveillance and sensor monitoring in order to identify potentially hazardous situations. The surveillance equipment includes video (e.g., CCTV cameras), audio systems and/or event recorder systems. The sensor equipment includes threat sensors (e.g., chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors) and object detection sensors (e.g., metal detectors). Transit user or transit vehicle operator activated alarms are provided on-board. Public areas (e.g., transit stops, park and ride lots, stations) are also monitored with similar surveillance and sensor equipment and provided with transit user activated alarms. In addition this service package provides surveillance and sensor monitoring of non-public areas of transit facilities (e.g., transit yards) and transit infrastructure such as bridges, tunnels, and transit railways or bus rapid transit (BRT) guideways. The surveillance equipment includes video and/or audio systems. The sensor equipment includes threat sensors and object detection sensors as described above as well as, intrusion or motion detection sensors and infrastructure integrity monitoring (e.g., rail track continuity checking or bridge structural integrity monitoring). Most of the surveillance and sensor data that is collected by this service package may be monitored by either the Emergency Management Center or the Transit Management Center, providing two possible approaches to implementing this service package. This service package also supports remote transit vehicle disabling and transit vehicle operator authentication by the Transit Management Center.	Existing	Emergency Centers 911



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
PT05	Transit Security	This service package provides for the physical security of transit passengers and transit vehicle operators. On-board equipment performs surveillance and sensor monitoring in order to identify potentially hazardous situations. The surveillance equipment includes video (e.g., CCTV cameras), audio systems and/or event recorder systems. The sensor equipment includes threat sensors (e.g., chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors) and object detection sensors (e.g., metal detectors). Transit user or transit vehicle operator activated alarms are provided on-board. Public areas (e.g., transit stops, park and ride lots, stations) are also monitored with similar surveillance and sensor equipment and provided with transit user activated alarms. In addition this service package provides surveillance and sensor monitoring of non-public areas of transit facilities (e.g., transit yards) and transit infrastructure such as bridges, tunnels, and transit railways or bus rapid transit (BRT) guideways. The surveillance equipment includes video and/or audio systems. The sensor equipment includes threat sensors and object detection sensors as described above as well as, intrusion or motion detection sensors and infrastructure integrity monitoring (e.g., rail track continuity checking or bridge structural integrity monitoring). Most of the surveillance and sensor data that is collected by this service package may be monitored by either the Emergency Management Center or the Transit Management Center, providing two possible approaches to implementing this service package. This service package also supports remote transit vehicle disabling and transit vehicle operator authentication by the Transit Management Center.	Existing	Public Services Transit
PT06	Transit Fleet Management	This service package supports automatic transit maintenance scheduling and monitoring. On-board condition sensors monitor system status and transmit critical status information to the Transit Management Center. The Transit Management Center processes this data and schedules preventative and corrective maintenance. The service package also supports the day to day management of the transit fleet inventory, including the assignment of specific transit vehicles to blocks and the assignment of transit vehicle operators to runs.	Existing	Public Services Transit
PT07	Transit Passenger Counting	This service package counts the number of passengers entering and exiting a transit vehicle using sensors mounted on the vehicle and communicates the collected passenger data back to the management center. The collected data can be used to calculate reliable ridership figures and measure passenger load information at particular stops.	Existing	Public Services Transit
PT08	Transit Traveler Information	This service package provides transit users at transit stops and on-board transit vehicles with ready access to transit information. The information services include transit stop announcement, imminent arrival signs, and real-time transit schedule displays that are of general interest to transit users. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this service package.	Existing	Event Promoter



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
PT08	Transit Traveler Information	This service package provides transit users at transit stops and on-board transit vehicles with ready access to transit information. The information services include transit stop annunciation, imminent arrival signs, and real-time transit schedule displays that are of general interest to transit users. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this service package.	Existing	Media
PT08	Transit Traveler Information	This service package provides transit users at transit stops and on-board transit vehicles with ready access to transit information. The information services include transit stop annunciation, imminent arrival signs, and real-time transit schedule displays that are of general interest to transit users. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this service package.	Existing	Public
PT08	Transit Traveler Information	This service package provides transit users at transit stops and on-board transit vehicles with ready access to transit information. The information services include transit stop annunciation, imminent arrival signs, and real-time transit schedule displays that are of general interest to transit users. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this service package.	Existing	Public Transit Services
PT09	Transit Signal Priority	The Transit Signal Priority service package uses transit vehicle to infrastructure communications to allow a transit vehicle to request priority at one or a series of intersections. The service package provides feedback to the transit driver indicating whether the signal priority has been granted or not. This service package can contribute to improved operating performance of the transit vehicles by reducing the time spent stopped at a red light.	Planned	ITS Field Equipment
PT09	Transit Signal Priority	The Transit Signal Priority service package uses transit vehicle to infrastructure communications to allow a transit vehicle to request priority at one or a series of intersections. The service package provides feedback to the transit driver indicating whether the signal priority has been granted or not. This service package can contribute to improved operating performance of the transit vehicles by reducing the time spent stopped at a red light.	Planned	LADOTD District Traffic Operations
PT09	Transit Signal Priority	The Transit Signal Priority service package uses transit vehicle to infrastructure communications to allow a transit vehicle to request priority at one or a series of intersections. The service package provides feedback to the transit driver indicating whether the signal priority has been granted or not. This service package can contribute to improved operating performance of the transit vehicles by reducing the time spent stopped at a red light.	Planned	Local DPW
PT09	Transit Signal Priority	The Transit Signal Priority service package uses transit vehicle to infrastructure communications to allow a transit vehicle to request priority at one or a series of intersections. The service package provides feedback to the transit driver indicating whether the signal priority has been granted or not. This service package can contribute to improved operating performance of the transit vehicles by reducing the time spent stopped at a red light.	Planned	Public Transit Services



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
PT09	Transit Signal Priority	The Transit Signal Priority service package uses transit vehicle to infrastructure communications to allow a transit vehicle to request priority at one or a series of intersections. The service package provides feedback to the transit driver indicating whether the signal priority has been granted or not. This service package can contribute to improved operating performance of the transit vehicles by reducing the time spent stopped at a red light.	Planned	TMC
PT09	Transit Signal Priority	The Transit Signal Priority service package uses transit vehicle to infrastructure communications to allow a transit vehicle to request priority at one or a series of intersections. The service package provides feedback to the transit driver indicating whether the signal priority has been granted or not. This service package can contribute to improved operating performance of the transit vehicles by reducing the time spent stopped at a red light.	Planned	Traffic Systems Signal
PT14	Multi-modal Coordination	This service package establishes two way communications between multiple transit and traffic agencies to improve service coordination. Multimodal coordination between transit agencies can increase traveler convenience at transit transfer points and clusters (a collection of stops, stations, or terminals where transfers can be made conveniently) and also improve operating efficiency.	Existing	Airports
PT14	Multi-modal Coordination	This service package establishes two way communications between multiple transit and traffic agencies to improve service coordination. Multimodal coordination between transit agencies can increase traveler convenience at transit transfer points and clusters (a collection of stops, stations, or terminals where transfers can be made conveniently) and also improve operating efficiency.	Existing	LADOTD District Traffic Operations
PT14	Multi-modal Coordination	This service package establishes two way communications between multiple transit and traffic agencies to improve service coordination. Multimodal coordination between transit agencies can increase traveler convenience at transit transfer points and clusters (a collection of stops, stations, or terminals where transfers can be made conveniently) and also improve operating efficiency.	Existing	Public Transit Services
PT14	Multi-modal Coordination	This service package establishes two way communications between multiple transit and traffic agencies to improve service coordination. Multimodal coordination between transit agencies can increase traveler convenience at transit transfer points and clusters (a collection of stops, stations, or terminals where transfers can be made conveniently) and also improve operating efficiency.	Existing	TMC
PT17	Transit Connection Protection	This service package allows travelers to initiate a request for connection protection anytime during the trip using a personal device or on-board equipment and receive a confirmation indicating whether the request is accepted. Connection protection uses real time data to examine the arrival status of a transit vehicle and to transmit a hold message to a vehicle or other mode of transportation (e.g. rail) in order for the traveler to make a successful transfer from one vehicle to another. Connection protection can be performed within a single agency, across multiple agencies, and across multiple modes. In an intermodal, multimodal or interagency environment, a transfer request brokerage system, represented by the Transit Management System, can be used to determine the feasibility of a connection protection request and support schedule coordination between agencies.	Planned	Personal Devices



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
PT17	Transit Connection Protection	This service package allows travelers to initiate a request for connection protection anytime during the trip using a personal device or on-board equipment and receive a confirmation indicating whether the request is accepted. Connection protection uses real time data to examine the arrival status of a transit vehicle and to transmit a hold message to a vehicle or other mode of transportation (e.g. rail) in order for the traveler to make a successful transfer from one vehicle to another. Connection protection can be performed within a single agency, across multiple agencies, and across multiple modes. In an intermodal, multimodal or interagency environment, a transfer request brokerage system, represented by the Transit Management System, can be used to determine the feasibility of a connection protection request and support schedule coordination between agencies.	Planned	Public Services Transit
ST01	Emissions Monitoring	This service package monitors individual vehicle emissions and provides general air quality monitoring using distributed sensors to collect the data. The collected information is transmitted to the Emissions Management Center for processing. Both area wide air quality monitoring and point emissions monitoring are supported by this service package. For area wide monitoring, this service package measures air quality, identifies sectors that are non-compliant with air quality standards, and collects, stores and reports supporting statistical data. For point emissions monitoring, this service package collects data from on-board diagnostic systems and measures tail pipe emissions to identify vehicles that exceed emissions standards and/or clean vehicles that could be released from standard emissions tests, depending on policy and regulations. Summary emissions information or warnings can also be displayed to drivers. The gathered information can be used to implement environmentally sensitive travel demand management (TDM) programs, policies, and regulations.	Existing	DEQ
SU03	Data Distribution	This service package manages the distribution of data from data providers to data consumers and protects those data from unauthorized access. It informs data providers of how to provide data, manages data subscriptions, and provides data forwarding capabilities. The service package also maintains a directory of System Users that want data and supports multiple distribution mechanisms including publish-subscribe and directly from data provider to data consumer. It allows data consumers to specify (and change the specification of) data they wish to receive.	Existing	LADOTD District Traffic Operations
SU03	Data Distribution	This service package manages the distribution of data from data providers to data consumers and protects those data from unauthorized access. It informs data providers of how to provide data, manages data subscriptions, and provides data forwarding capabilities. The service package also maintains a directory of System Users that want data and supports multiple distribution mechanisms including publish-subscribe and directly from data provider to data consumer. It allows data consumers to specify (and change the specification of) data they wish to receive.	Existing	TMC



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TI01	Broadcast Traveler Information	This service package provides a digital broadcast service that disseminates traveler information to all equipped travelers within range. It collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, roadway maintenance and construction information, air quality and weather information, and broadcasts the information to travelers using technologies such as FM subcarrier, satellite radio, cellular data broadcasts, and Internet streaming technologies. This service package also provides location-specific or situation-relevant information to travelers in vehicles using Dedicated Short Range Communications (DSRC) infrastructure supporting mobility service packages for connected vehicles. DSRC is used to deliver real-time traveler information including travel times, incident information, road conditions, and emergency traveler information to vehicles as they pass connected vehicle roadside equipment along their route. This service package provides public information that is available to all equipped vehicles in the vicinity of the roadside equipment.	Existing	LADOTD Social Media
TI01	Broadcast Traveler Information	This service package provides a digital broadcast service that disseminates traveler information to all equipped travelers within range. It collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, roadway maintenance and construction information, air quality and weather information, and broadcasts the information to travelers using technologies such as FM subcarrier, satellite radio, cellular data broadcasts, and Internet streaming technologies. This service package also provides location-specific or situation-relevant information to travelers in vehicles using Dedicated Short Range Communications (DSRC) infrastructure supporting mobility service packages for connected vehicles. DSRC is used to deliver real-time traveler information including travel times, incident information, road conditions, and emergency traveler information to vehicles as they pass connected vehicle roadside equipment along their route. This service package provides public information that is available to all equipped vehicles in the vicinity of the roadside equipment.	Existing	Louisiana Website 511
TI01	Broadcast Traveler Information	This service package provides a digital broadcast service that disseminates traveler information to all equipped travelers within range. It collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, roadway maintenance and construction information, air quality and weather information, and broadcasts the information to travelers using technologies such as FM subcarrier, satellite radio, cellular data broadcasts, and Internet streaming technologies. This service package also provides location-specific or situation-relevant information to travelers in vehicles using Dedicated Short Range Communications (DSRC) infrastructure supporting mobility service packages for connected vehicles. DSRC is used to deliver real-time traveler information including travel times, incident information, road conditions, and emergency traveler information to vehicles as they pass connected vehicle roadside equipment along their route. This service package provides public information that is available to all equipped vehicles in the vicinity of the roadside equipment.	Existing	Media



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TI01	Broadcast Traveler Information	This service package provides a digital broadcast service that disseminates traveler information to all equipped travelers within range. It collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, roadway maintenance and construction information, air quality and weather information, and broadcasts the information to travelers using technologies such as FM subcarrier, satellite radio, cellular data broadcasts, and Internet streaming technologies. This service package also provides location-specific or situation-relevant information to travelers in vehicles using Dedicated Short Range Communications (DSRC) infrastructure supporting mobility service packages for connected vehicles. DSRC is used to deliver real-time traveler information including travel times, incident information, road conditions, and emergency traveler information to vehicles as they pass connected vehicle roadside equipment along their route. This service package provides public information that is available to all equipped vehicles in the vicinity of the roadside equipment.	Existing	Personal Devices
TI02	Personalized Traveler Information	This service package provides tailored information in response to a traveler request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported. The traveler can obtain current information regarding traffic conditions, roadway maintenance and construction, transit services, ride share/ride match, parking management, detours and pricing information. Although the Internet is the predominate network used for traveler information dissemination, a range of two-way wide-area wireless and fixed-point to fixed-point communications systems may be used to support the required data communications with the traveler. A variety of interactive devices may be used by the traveler to access information prior to a trip or en route including phone via a 511-like portal and web pages via smart phone, tablet, personal computer, and a variety of in-vehicle devices.	Existing	LADOTD Social Media
TI02	Personalized Traveler Information	This service package provides tailored information in response to a traveler request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported. The traveler can obtain current information regarding traffic conditions, roadway maintenance and construction, transit services, ride share/ride match, parking management, detours and pricing information. Although the Internet is the predominate network used for traveler information dissemination, a range of two-way wide-area wireless and fixed-point to fixed-point communications systems may be used to support the required data communications with the traveler. A variety of interactive devices may be used by the traveler to access information prior to a trip or en route including phone via a 511-like portal and web pages via smart phone, tablet, personal computer, and a variety of in-vehicle devices.	Existing	Louisiana Website 511



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TI02	Personalized Traveler Information	This service package provides tailored information in response to a traveler request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported. The traveler can obtain current information regarding traffic conditions, roadway maintenance and construction, transit services, ride share/ride match, parking management, detours and pricing information. Although the Internet is the predominate network used for traveler information dissemination, a range of two-way wide-area wireless and fixed-point to fixed-point communications systems may be used to support the required data communications with the traveler. A variety of interactive devices may be used by the traveler to access information prior to a trip or en route including phone via a 511-like portal and web pages via smart phone, tablet, personal computer, and a variety of in-vehicle devices.	Existing	Personal Devices
TM01	Infrastructure-Based Traffic Surveillance	This service package includes traffic detectors, other surveillance equipment, the supporting field equipment, and Center to Field communications to transmit the collected data back to the Traffic Management Center. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Center). The data generated by this service package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Traveler Information Center physical object.	Existing	ITS Field Equipment
TM01	Infrastructure-Based Traffic Surveillance	This service package includes traffic detectors, other surveillance equipment, the supporting field equipment, and Center to Field communications to transmit the collected data back to the Traffic Management Center. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Center). The data generated by this service package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Traveler Information Center physical object.	Existing	LADOTD District Traffic Operations



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM01	Infrastructure-Based Traffic Surveillance	This service package includes traffic detectors, other surveillance equipment, the supporting field equipment, and Center to Field communications to transmit the collected data back to the Traffic Management Center. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Center). The data generated by this service package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Traveler Information Center physical object.	Existing	LADOTD ITS Section 56
TM01	Infrastructure-Based Traffic Surveillance	This service package includes traffic detectors, other surveillance equipment, the supporting field equipment, and Center to Field communications to transmit the collected data back to the Traffic Management Center. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Center). The data generated by this service package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Traveler Information Center physical object.	Existing	TMC
TM06	Traffic Information Dissemination	This service package provides driver information using roadway equipment such as dynamic message signs or highway advisory radio. A wide range of information can be disseminated including traffic and road conditions, closure and detour information, travel restrictions, incident information, and emergency alerts and driver advisories. This package provides information to drivers at specific equipped locations on the road network. Careful placement of the roadway equipment provides the information at points in the network where the drivers have recourse and can tailor their routes to account for the new information. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), Transit Management, Emergency Management, and Transportation Information Centers. A link to the Maintenance and Construction Management Center allows real time information on road/bridge closures and restrictions due to maintenance and construction activities to be disseminated.	Existing	Event Promoter



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM06	Traffic Information Dissemination	This service package provides driver information using roadway equipment such as dynamic message signs or highway advisory radio. A wide range of information can be disseminated including traffic and road conditions, closure and detour information, travel restrictions, incident information, and emergency alerts and driver advisories. This package provides information to drivers at specific equipped locations on the road network. Careful placement of the roadway equipment provides the information at points in the network where the drivers have recourse and can tailor their routes to account for the new information. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), Transit Management, Emergency Management, and Transportation Information Centers. A link to the Maintenance and Construction Management Center allows real time information on road/bridge closures and restrictions due to maintenance and construction activities to be disseminated.	Existing	LADOTD Social Media
TM06	Traffic Information Dissemination	This service package provides driver information using roadway equipment such as dynamic message signs or highway advisory radio. A wide range of information can be disseminated including traffic and road conditions, closure and detour information, travel restrictions, incident information, and emergency alerts and driver advisories. This package provides information to drivers at specific equipped locations on the road network. Careful placement of the roadway equipment provides the information at points in the network where the drivers have recourse and can tailor their routes to account for the new information. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), Transit Management, Emergency Management, and Transportation Information Centers. A link to the Maintenance and Construction Management Center allows real time information on road/bridge closures and restrictions due to maintenance and construction activities to be disseminated.	Existing	Louisiana Website 511



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM06	Traffic Information Dissemination	This service package provides driver information using roadway equipment such as dynamic message signs or highway advisory radio. A wide range of information can be disseminated including traffic and road conditions, closure and detour information, travel restrictions, incident information, and emergency alerts and driver advisories. This package provides information to drivers at specific equipped locations on the road network. Careful placement of the roadway equipment provides the information at points in the network where the drivers have recourse and can tailor their routes to account for the new information. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), Transit Management, Emergency Management, and Transportation Information Centers. A link to the Maintenance and Construction Management Center allows real time information on road/bridge closures and restrictions due to maintenance and construction activities to be disseminated.	Existing	Media
TM06	Traffic Information Dissemination	This service package provides driver information using roadway equipment such as dynamic message signs or highway advisory radio. A wide range of information can be disseminated including traffic and road conditions, closure and detour information, travel restrictions, incident information, and emergency alerts and driver advisories. This package provides information to drivers at specific equipped locations on the road network. Careful placement of the roadway equipment provides the information at points in the network where the drivers have recourse and can tailor their routes to account for the new information. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), Transit Management, Emergency Management, and Transportation Information Centers. A link to the Maintenance and Construction Management Center allows real time information on road/bridge closures and restrictions due to maintenance and construction activities to be disseminated.	Existing	TMC



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM06	Traffic Information Dissemination	This service package provides driver information using roadway equipment such as dynamic message signs or highway advisory radio. A wide range of information can be disseminated including traffic and road conditions, closure and detour information, travel restrictions, incident information, and emergency alerts and driver advisories. This package provides information to drivers at specific equipped locations on the road network. Careful placement of the roadway equipment provides the information at points in the network where the drivers have recourse and can tailor their routes to account for the new information. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), Transit Management, Emergency Management, and Transportation Information Centers. A link to the Maintenance and Construction Management Center allows real time information on road/bridge closures and restrictions due to maintenance and construction activities to be disseminated.	Existing	Workzone ITS
TM07	Regional Traffic Management	This service package provides for the sharing of information and control among traffic management centers to support regional traffic management strategies. Regional traffic management strategies that are supported include inter-jurisdictional, real-time coordinated traffic signal control systems and coordination between freeway operations and traffic signal control within a corridor. This service package advances the TM03-Traffic Signal Control and TM05-Traffic Metering service packages by adding the communications links and integrated control strategies that enable integrated, interjurisdictional traffic management. The nature of optimization and extent of information and control sharing is determined through working arrangements between jurisdictions. This package relies principally on roadside instrumentation supported by the Traffic Signal Control and Traffic Metering service packages and adds hardware, software, and fixed-point communications capabilities to implement traffic management strategies that are coordinated between allied traffic management centers. Several levels of coordination are supported from sharing of information through sharing of device control between traffic management centers.	Existing	LADOTD District Traffic Operations



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM07	Regional Traffic Management	This service package provides for the sharing of information and control among traffic management centers to support regional traffic management strategies. Regional traffic management strategies that are supported include inter-jurisdictional, real-time coordinated traffic signal control systems and coordination between freeway operations and traffic signal control within a corridor. This service package advances the TM03-Traffic Signal Control and TM05-Traffic Metering service packages by adding the communications links and integrated control strategies that enable integrated, interjurisdictional traffic management. The nature of optimization and extent of information and control sharing is determined through working arrangements between jurisdictions. This package relies principally on roadside instrumentation supported by the Traffic Signal Control and Traffic Metering service packages and adds hardware, software, and fixed-point communications capabilities to implement traffic management strategies that are coordinated between allied traffic management centers. Several levels of coordination are supported from sharing of information through sharing of device control between traffic management centers.	Existing	LADOTD ITS Section 56
TM07	Regional Traffic Management	This service package provides for the sharing of information and control among traffic management centers to support regional traffic management strategies. Regional traffic management strategies that are supported include inter-jurisdictional, real-time coordinated traffic signal control systems and coordination between freeway operations and traffic signal control within a corridor. This service package advances the TM03-Traffic Signal Control and TM05-Traffic Metering service packages by adding the communications links and integrated control strategies that enable integrated, interjurisdictional traffic management. The nature of optimization and extent of information and control sharing is determined through working arrangements between jurisdictions. This package relies principally on roadside instrumentation supported by the Traffic Signal Control and Traffic Metering service packages and adds hardware, software, and fixed-point communications capabilities to implement traffic management strategies that are coordinated between allied traffic management centers. Several levels of coordination are supported from sharing of information through sharing of device control between traffic management centers.	Existing	LSP



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM07	Regional Traffic Management	This service package provides for the sharing of information and control among traffic management centers to support regional traffic management strategies. Regional traffic management strategies that are supported include inter-jurisdictional, real-time coordinated traffic signal control systems and coordination between freeway operations and traffic signal control within a corridor. This service package advances the TM03-Traffic Signal Control and TM05-Traffic Metering service packages by adding the communications links and integrated control strategies that enable integrated, interjurisdictional traffic management. The nature of optimization and extent of information and control sharing is determined through working arrangements between jurisdictions. This package relies principally on roadside instrumentation supported by the Traffic Signal Control and Traffic Metering service packages and adds hardware, software, and fixed-point communications capabilities to implement traffic management strategies that are coordinated between allied traffic management centers. Several levels of coordination are supported from sharing of information through sharing of device control between traffic management centers.	Existing	TMC
TM08	Traffic Incident Management System	This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The service package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as rail operations and event promoters. Information from these diverse sources is collected and correlated by this service package to detect and verify incidents and implement an appropriate response. This service package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between centers. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination service package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information service packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through a CAD system or through other communication with emergency personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel. This service package is closely related with the Public Safety service packages, which focus on services that support first responders. In particular, local management of the incident using an incident command system is covered by PS02.	Existing	Emergency Centers 911



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM08	Traffic Incident Management System	<p>This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The service package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as rail operations and event promoters. Information from these diverse sources is collected and correlated by this service package to detect and verify incidents and implement an appropriate response. This service package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between centers. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination service package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information service packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through a CAD system or through other communication with emergency personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel. This service package is closely related with the Public Safety service packages, which focus on services that support first responders. In particular, local management of the incident using an incident command system is covered by PS02.</p>	Existing	Emergency Services Functions



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM08	Traffic Incident Management System	<p>This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The service package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as rail operations and event promoters. Information from these diverse sources is collected and correlated by this service package to detect and verify incidents and implement an appropriate response. This service package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between centers. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination service package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information service packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through a CAD system or through other communication with emergency personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel. This service package is closely related with the Public Safety service packages, which focus on services that support first responders. In particular, local management of the incident using an incident command system is covered by PS02.</p>	Existing	HAZMAT Response Mobile



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TM08	Traffic Incident Management System	<p>This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The service package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as rail operations and event promoters. Information from these diverse sources is collected and correlated by this service package to detect and verify incidents and implement an appropriate response. This service package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between centers. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination service package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information service packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through a CAD system or through other communication with emergency personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel. This service package is closely related with the Public Safety service packages, which focus on services that support first responders. In particular, local management of the incident using an incident command system is covered by PS02.</p>	Existing	LADOTD District Traffic Operations



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM08	Traffic Incident Management System	<p>This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The service package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as rail operations and event promoters. Information from these diverse sources is collected and correlated by this service package to detect and verify incidents and implement an appropriate response. This service package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between centers. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination service package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information service packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through a CAD system or through other communication with emergency personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel. This service package is closely related with the Public Safety service packages, which focus on services that support first responders. In particular, local management of the incident using an incident command system is covered by PS02.</p>	Existing	LADOTD Social Media



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM08	Traffic Incident Management System	<p>This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The service package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as rail operations and event promoters. Information from these diverse sources is collected and correlated by this service package to detect and verify incidents and implement an appropriate response. This service package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between centers. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination service package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information service packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through a CAD system or through other communication with emergency personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel. This service package is closely related with the Public Safety service packages, which focus on services that support first responders. In particular, local management of the incident using an incident command system is covered by PS02.</p>	Existing	Local Emergency Services



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM08	Traffic Incident Management System	<p>This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The service package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as rail operations and event promoters. Information from these diverse sources is collected and correlated by this service package to detect and verify incidents and implement an appropriate response. This service package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between centers. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination service package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information service packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through a CAD system or through other communication with emergency personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel. This service package is closely related with the Public Safety service packages, which focus on services that support first responders. In particular, local management of the incident using an incident command system is covered by PS02.</p>	Existing	Local Public Safety Agencies



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM08	Traffic Incident Management System	<p>This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The service package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as rail operations and event promoters. Information from these diverse sources is collected and correlated by this service package to detect and verify incidents and implement an appropriate response. This service package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between centers. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination service package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information service packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through a CAD system or through other communication with emergency personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel. This service package is closely related with the Public Safety service packages, which focus on services that support first responders. In particular, local management of the incident using an incident command system is covered by PS02.</p>	Existing	Louisiana Website 511



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM08	Traffic Incident Management System	<p>This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The service package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as rail operations and event promoters. Information from these diverse sources is collected and correlated by this service package to detect and verify incidents and implement an appropriate response. This service package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between centers. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination service package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information service packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through a CAD system or through other communication with emergency personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel. This service package is closely related with the Public Safety service packages, which focus on services that support first responders. In particular, local management of the incident using an incident command system is covered by PS02.</p>	Existing	LSP



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM08	Traffic Incident Management System	This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The service package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as rail operations and event promoters. Information from these diverse sources is collected and correlated by this service package to detect and verify incidents and implement an appropriate response. This service package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between centers. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination service package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information service packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through a CAD system or through other communication with emergency personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel. This service package is closely related with the Public Safety service packages, which focus on services that support first responders. In particular, local management of the incident using an incident command system is covered by PS02.	Existing	TMC
TM09	Integrated Decision Support and Demand Management	This service package recommends courses of action to transportation operators in a corridor, downtown area, or other heavily traveled area. Recommendations are based on an assessment of current and forecast transportation network performance and environmental conditions. Multi-modal transportation operational strategies are created that consider all modes and all roads in the travel area to correct network imbalances and effectively manage available capacity. As part of the operational strategies, this service package may also recommend lane restrictions, transit, parking, and toll strategies to influence traveler route and mode choices to support active demand management programs and policies managing both traffic and the environment. Operational strategies, including demand management recommendations, are coordinated to support operational decisions by each transportation operator that are consistent with the recommended strategy. All recommended operational strategies are based on historical evaluation, real-time assessment, and forecast of the roadway network performance based on predicted travel demand patterns. This service package also collects air quality, parking availability, transit usage, and vehicle occupancy data to support operational strategies that manage and balance capacity and demand.	Existing	LADOTD District Traffic Operations



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM09	Integrated Decision Support and Demand Management	This service package recommends courses of action to transportation operators in a corridor, downtown area, or other heavily traveled area. Recommendations are based on an assessment of current and forecast transportation network performance and environmental conditions. Multi-modal transportation operational strategies are created that consider all modes and all roads in the travel area to correct network imbalances and effectively manage available capacity. As part of the operational strategies, this service package may also recommend lane restrictions, transit, parking, and toll strategies to influence traveler route and mode choices to support active demand management programs and policies managing both traffic and the environment. Operational strategies, including demand management recommendations, are coordinated to support operational decisions by each transportation operator that are consistent with the recommended strategy. All recommended operational strategies are based on historical evaluation, real-time assessment, and forecast of the roadway network performance based on predicted travel demand patterns. This service package also collects air quality, parking availability, transit usage, and vehicle occupancy data to support operational strategies that manage and balance capacity and demand.	Existing	TMC
TM10	Electronic Toll Collection	The Electronic Toll Collection service package provides toll operators with the ability to collect tolls electronically and detect and process violations. The fees that are collected may be adjusted to implement demand management strategies. Field-Vehicle Communication between the roadway equipment and the vehicle is required as well as Fixed Point-Fixed Point interfaces between the toll collection equipment and transportation authorities and the financial infrastructure that supports fee collection. Toll violations are identified and electronically posted to vehicle owners. Standards, inter-agency coordination, and financial clearinghouse capabilities enable broad interoperability for these services.	Existing	GNOEC/LADOTD
TM10	Electronic Toll Collection	The Electronic Toll Collection service package provides toll operators with the ability to collect tolls electronically and detect and process violations. The fees that are collected may be adjusted to implement demand management strategies. Field-Vehicle Communication between the roadway equipment and the vehicle is required as well as Fixed Point-Fixed Point interfaces between the toll collection equipment and transportation authorities and the financial infrastructure that supports fee collection. Toll violations are identified and electronically posted to vehicle owners. Standards, inter-agency coordination, and financial clearinghouse capabilities enable broad interoperability for these services.	Existing	Toll Plaza



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
TM16	Reversible Lane Management	This service package provides for the management of reversible lane facilities. In addition to standard surveillance capabilities, this service package includes sensory functions that detect wrong-way vehicles and other special surveillance capabilities that mitigate safety hazards associated with reversible lanes. The package includes the field equipment, physical lane access controls, and associated control electronics that manage and control these special lanes. This service package also includes the equipment used to electronically reconfigure intersections and manage right-of-way to address dynamic demand changes and special events.	Planned	ITS Field Equipment
TM16	Reversible Lane Management	This service package provides for the management of reversible lane facilities. In addition to standard surveillance capabilities, this service package includes sensory functions that detect wrong-way vehicles and other special surveillance capabilities that mitigate safety hazards associated with reversible lanes. The package includes the field equipment, physical lane access controls, and associated control electronics that manage and control these special lanes. This service package also includes the equipment used to electronically reconfigure intersections and manage right-of-way to address dynamic demand changes and special events.	Planned	LADOTD District Traffic Operations
TM16	Reversible Lane Management	This service package provides for the management of reversible lane facilities. In addition to standard surveillance capabilities, this service package includes sensory functions that detect wrong-way vehicles and other special surveillance capabilities that mitigate safety hazards associated with reversible lanes. The package includes the field equipment, physical lane access controls, and associated control electronics that manage and control these special lanes. This service package also includes the equipment used to electronically reconfigure intersections and manage right-of-way to address dynamic demand changes and special events.	Planned	TMC
WX01	Weather Data Collection	This service package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway. It also collects data from vehicles in the road network that can be used to directly measure or infer current environmental conditions. It leverages vehicle on-board systems that measure temperature, sense current weather conditions (rain and sun sensors) and also can monitor aspects of the vehicle operational status (e.g., use of headlights, wipers, and traction control system) to gather information about local environmental conditions. In addition, environmental sensor systems located on Maintenance and Construction Vehicles are also potential data sources. The collected environmental data is used by the Weather Information Processing and Distribution service package to process the information and make decisions on operations. The collected environmental data may be aggregated, combined with data attributes and sent to meteorological systems for data qualification and further data consolidation. The service package may also request and receive qualified data sets from meteorological systems.	Existing	ITS Field Equipment



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
WX01	Weather Data Collection	This service package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway. It also collects data from vehicles in the road network that can be used to directly measure or infer current environmental conditions. It leverages vehicle on-board systems that measure temperature, sense current weather conditions (rain and sun sensors) and also can monitor aspects of the vehicle operational status (e.g., use of headlights, wipers, and traction control system) to gather information about local environmental conditions. In addition, environmental sensor systems located on Maintenance and Construction Vehicles are also potential data sources. The collected environmental data is used by the Weather Information Processing and Distribution service package to process the information and make decisions on operations. The collected environmental data may be aggregated, combined with data attributes and sent to meteorological systems for data qualification and further data consolidation. The service package may also request and receive qualified data sets from meteorological systems.	Existing	LADOTD Flood Warning Systems
WX01	Weather Data Collection	This service package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway. It also collects data from vehicles in the road network that can be used to directly measure or infer current environmental conditions. It leverages vehicle on-board systems that measure temperature, sense current weather conditions (rain and sun sensors) and also can monitor aspects of the vehicle operational status (e.g., use of headlights, wipers, and traction control system) to gather information about local environmental conditions. In addition, environmental sensor systems located on Maintenance and Construction Vehicles are also potential data sources. The collected environmental data is used by the Weather Information Processing and Distribution service package to process the information and make decisions on operations. The collected environmental data may be aggregated, combined with data attributes and sent to meteorological systems for data qualification and further data consolidation. The service package may also request and receive qualified data sets from meteorological systems.	Existing	TMC
WX02	Weather Information Processing and Distribution	This service package processes and distributes the environmental information collected from the Weather Data Collection service package. This service package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so operational centers and decision support systems can make decision on corrective actions to take. The continuing updates of road condition information and current temperatures can be used to more effectively deploy road maintenance resources, issue general traveler advisories, issue location specific warnings to drivers using the Traffic Information Dissemination service package, and aid operators in scheduling work activity.	Existing	GOHSEP



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
WX02	Weather Information Processing and Distribution	This service package processes and distributes the environmental information collected from the Weather Data Collection service package. This service package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so operational centers and decision support systems can make decision on corrective actions to take. The continuing updates of road condition information and current temperatures can be used to more effectively deploy road maintenance resources, issue general traveler advisories, issue location specific warnings to drivers using the Traffic Information Dissemination service package, and aid operators in scheduling work activity.	Existing	LADOTD District Traffic Operations
WX02	Weather Information Processing and Distribution	This service package processes and distributes the environmental information collected from the Weather Data Collection service package. This service package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so operational centers and decision support systems can make decision on corrective actions to take. The continuing updates of road condition information and current temperatures can be used to more effectively deploy road maintenance resources, issue general traveler advisories, issue location specific warnings to drivers using the Traffic Information Dissemination service package, and aid operators in scheduling work activity.	Existing	LADOTD Social Media
WX02	Weather Information Processing and Distribution	This service package processes and distributes the environmental information collected from the Weather Data Collection service package. This service package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so operational centers and decision support systems can make decision on corrective actions to take. The continuing updates of road condition information and current temperatures can be used to more effectively deploy road maintenance resources, issue general traveler advisories, issue location specific warnings to drivers using the Traffic Information Dissemination service package, and aid operators in scheduling work activity.	Existing	Louisiana Website 511
WX02	Weather Information Processing and Distribution	This service package processes and distributes the environmental information collected from the Weather Data Collection service package. This service package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so operational centers and decision support systems can make decision on corrective actions to take. The continuing updates of road condition information and current temperatures can be used to more effectively deploy road maintenance resources, issue general traveler advisories, issue location specific warnings to drivers using the Traffic Information Dissemination service package, and aid operators in scheduling work activity.	Existing	Media



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Service Package	Service Package Name	Service Package Description	Service Package Status	Included Elements
WX02	Weather Information Processing and Distribution	This service package processes and distributes the environmental information collected from the Weather Data Collection service package. This service package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so operational centers and decision support systems can make decision on corrective actions to take. The continuing updates of road condition information and current temperatures can be used to more effectively deploy road maintenance resources, issue general traveler advisories, issue location specific warnings to drivers using the Traffic Information Dissemination service package, and aid operators in scheduling work activity.	Existing	TMC



APPENDIX B ITS FUNCTIONAL REQUIREMENTS

Appendix Table B-1: ITS Functional Requirements

Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Airports	Parking Area Equipment	Parking Area Electronic Payment	'Parking Area Electronic Payment' supports electronic payment of parking fees using in-vehicle equipment (e.g., tags) or contact or proximity cards. It includes the field elements that provide the interface to the in-vehicle or card payment device and the back-office functionality that performs the transaction.	Existing
Airports	Parking Area Equipment	Parking Area Management	'Parking Area Management' detects and classifies vehicles at parking facility entrances, exits, and other designated locations within the facility. Current parking availability is monitored and used to inform drivers through dynamic message signs/displays so that vehicles are efficiently routed to available spaces. Parking facility information, including current parking rates and directions to entrances and available exits, is also provided to drivers.	Existing, Planned
Airports	Parking Management Center	Parking Coordination	'Parking Coordination' supports communication and coordination between equipped parking facilities and also supports regional coordination between parking facilities and traffic management systems. Coordination with traffic management supports local traffic control coordination in and around the parking facility and broader regional coordination. It also shares information with transit management systems and information providers to support multimodal travel planning, including parking reservations capabilities. Information including current parking availability, system status, and operating strategies are shared to enable local parking facility management that supports regional transportation strategies.	Existing, Planned
Airports	Parking Management Center	Parking Data Collection	'Parking Data Collection' collects and stores parking information that is collected in the course of parking system operations. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.	Existing



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Element Name		Physical Object Name	Functional Object	Functional Object Description	Status
Commercial Operators	Vehicle	Commercial Vehicle Administration Center	CVAC Credentials and Taxes Administration	'CVAC Credentials and Taxes Administration' issues credentials, collects fees and taxes, and supports enforcement of credential requirements. It manages driver licensing and enrolls carriers in additional CVO programs such as wireless roadside inspection programs. It communicates with the Fleet and Freight Management Centers associated with the motor carriers to process applications and collect fuel taxes, weight/distance taxes, and other taxes and fees associated with commercial vehicle operations. It also receives applications for, and issues special Oversize/Overweight and HAZMAT permits in coordination with other cognizant authorities. It supports user account management and receives and processes requests for review of carrier and driver status. It communicates with peer functional objects in other jurisdictions to exchange credentials database information.	Existing
Commercial Operators	Vehicle	Commercial Vehicle Administration Center	CVAC Data Collection	'CVAC Data Collection' collects and stores commercial vehicle information that is collected in the course of Commercial Vehicle Administration Center operations. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.	Existing
Commercial Operators	Vehicle	Commercial Vehicle Administration Center	CVAC Information Exchange	'CVAC Information Exchange' supports the exchange of safety, credentials, permit data, and other data concerning the operation of commercial vehicles among jurisdictions. The object also supports the exchange of safety (e.g., driver logs), credentials, permit, and operations data between systems (for example, an administrative center and the roadside check facilities) within a single jurisdiction. Data are collected from multiple authoritative sources and packaged into snapshots (top-level summary and critical status information) and profiles (detailed and historical data). Data is made available to fleet operators and other information requestors on request or based on subscriptions established by the requestor.	



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Element Name		Physical Object Name	Functional Object	Functional Object Description	Status
Commercial Operators	Vehicle	Commercial Vehicle Administration Center	CVAC Safety and Security Administration	'CVAC Safety and Security Administration' provides commercial vehicle safety and security criteria to roadside check facilities, collects and reviews safety and security data from the field and distributes safety and security information to other centers, carriers, and enforcement agencies. It also supports wireless roadside inspections, including carrier enrollment, managing and distributing information about trigger areas where wireless inspections may occur, and monitoring the condition of the commercial vehicle and driver using wireless communications at identified trigger areas. It supports the collection and review of carrier and driver safety and security data and supports determination of the carrier and driver safety and security ratings. It clears the out-of-service status when the responsible carrier or driver reports that deficiencies flagged during inspections have been corrected.	
Commercial Operators	Vehicle	Fleet and Freight Management Center	Fleet Credentials and Taxes Management and Reporting	'Fleet Credentials and Taxes Management and Reporting' provides the capability to purchase credentials, file taxes and trip reports electronically, apply for permits, and perform electronic enrollment in expedited border crossing programs. It tracks and manages credentials and provides electronic interfaces to appropriate state and federal commercial vehicle administration centers.	Existing
Commercial Operators, CVO Inspection Stations, Event Promoter, TMC	Vehicle	Center	Center Permission Management	'Center Permission Management' enables Connected Vehicle system users to request permission to access connected vehicle services. A center may request permission for the center or the infrastructure devices and vehicles associated with the center.	
Commercial Operators, CVO Inspection Stations, LADOTD District Traffic Operations, TMC	Vehicle	Center	Center Connected Vehicle Infrastructure Management	'Center Connected Vehicle Infrastructure Management' is the back office application that supports monitoring and maintenance of the Connected Vehicle infrastructure (RSEs, support systems, and associated communications links). It monitors the performance and configuration of the infrastructure portion of the Connected Vehicle Environment. This includes tracking and management of the infrastructure configuration as well as detection, isolation, and correction of infrastructure service problems. The application also includes monitoring of performance of the infrastructure equipment, including RSEs and communications links.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Commercial Vehicle Operators, Ports	Fleet and Freight Management Center	Fleet Administration	'Fleet Administration' provides vehicle tracking, dispatch, and reporting capabilities to fleet management personnel. It gathers current road conditions, commercial vehicle-specific traffic and parking information, prepares vehicle routes, and provides a fleet interface for toll collection. It also provides route plan information for network performance evaluation. As part of the tracking function, it monitors commercial vehicle location, compares it against the known route and notifies the Emergency Management Center and Fleet-Freight Manager of any deviations, including HAZMAT route restriction violations. It supports carrier participation in wireless roadside inspection programs, monitoring geographic trigger areas and providing current safety data on behalf of the commercial vehicles it manages. It supports pre-hiring checks for potential drivers and monitors the performance of each driver who is hired. It also supports ongoing monitoring of the company's safety performance.	Existing
Commercial Vehicle Operators, Ports	Fleet and Freight Management Center	Freight Administration and Management	'Freight Administration and Management' manages the movement of freight from source to destination. It interfaces to intermodal customers to setup and schedule transportation and coordinates with intermodal terminals and freight consolidation stations to coordinate the shipment. It coordinates with the appropriate government agencies to expedite the movement of trucks, their drivers, and their cargo across international borders. The application monitors the status of the freight and freight equipment (container, trailer, or chassis) and monitors freight location and compares it against the planned route.	Existing
Commercial Vehicles	Commercial Vehicle OBE	CV Driver Work Records	'CV Driver Work Records' monitors the commercial vehicle driver's working hours and hours of rest. It is physical connected with the commercial vehicle to automate data collection. It provides the capability for the driver to verify and annotate the collected records and makes such records securely available to the carrier and safety officials. The device or devices associated with this functional object and associated cloud services that facilitate communications are frequently provided by third party service providers.	
Commercial Vehicles	Commercial Vehicle OBE	CV On-Board Electronic Screening Support	'CV On-Board Electronic Screening Support' exchanges information with roadside facilities, providing information such as driver, vehicle, and carrier identification to roadside facilities that can be used to support electronic screening. Pass/pull-in messages are received and presented to the commercial vehicle driver and screening events are recorded. Additional information, including trip records (e.g., border clearance information), safety inspection records, cargo information, and driver status information may also be collected, stored, and made available to the roadside facility.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Connected Vehicle	Commercial Vehicle OBE	CV On-Board Cargo Monitoring	'CV On-Board Cargo Monitoring' monitors the location and status of the commercial vehicle and its cargo. It sends the collected data to appropriate centers and roadside facilities, including emergency management in the case of HAZMAT incidents. Depending on the nature of the cargo, it may include sensors that measure temperature, pressure, load leveling, acceleration, and other attributes of the cargo.	Planned
Connected Vehicle	Commercial Vehicle OBE	CV On-Board Safety and Security	'CV On-Board Safety and Security' collects and processes vehicle and driver safety and security information and provides safety and security information to the Fleet and Freight Management Center. It also supplies this information to the roadside facilities both at mainline speeds and while stopped for inspections. Safety information may also be provided at predetermined trigger areas using wireless communications. The capability to alert the commercial vehicle driver whenever there is a critical safety or security problem or potential emergency is also provided. It also supports on-board driver safety log maintenance and checking.	Planned
Connected Vehicle	Commercial Vehicle OBE	CV On-Board Special Vehicle Safety	'CV On-Board Special Vehicle Safety' alerts vehicles in the vicinity of a commercial vehicle that is oversized, slow, or performs maneuvers that may impact surrounding vehicles.	
Connected Vehicle	Commercial Vehicle OBE	CV On-Board Trip Monitoring	'CV On-Board Trip Monitoring' provides the capabilities to support fleet management with automatic vehicle location and automated mileage and fuel reporting and auditing. In addition, this equipment is used to monitor the planned route and notify the Fleet and Freight Management Center of any deviations.	Planned
Connected Vehicle	Freight Equipment	Freight Equipment Monitoring	'Freight Equipment Monitoring' includes the on-board devices used to monitor intermodal freight equipment. These devices provide freight equipment location and status of the freight, container, or chassis equipment.	Planned
Connected Vehicle	Light Vehicle OBE	Light Vehicle Access	'Light Vehicle Access' provides access to a shared use vehicle either remotely from a center or locally with a traveler device.	
Connected Vehicle	Light Vehicle OBE	Light Vehicle Basic Toll/Parking Payment	'Vehicle Basic Toll/Parking Payment' includes the traditional on-board systems that pay for tolls and parking electronically. It includes the in-vehicle equipment that communicates with the toll/parking plaza and an optional interface to a carry-in payment device. See also 'Vehicle Payment Services', which provides a broader range of payment services.	Planned



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Connected Vehicle	Light Vehicle OBE	Light Vehicle Electric Charging Assist	'Light Vehicle Electric Charging Assist' uses short range communications to coordinate with electric charging stations, providing information about the operational state of the electrical system, the maximum charge rate, and the percentage-complete of the charge. This application also receives current information about electric charging systems in the region and makes this information available to the driver on request.	
Connected Vehicle	Light Vehicle OBE	Light Vehicle Interactive Traveler Information	'Light Vehicle Interactive Traveler Information' provides drivers with personalized traveler information including traffic and road conditions, transit information, maintenance and construction information, multimodal information, event information, and weather information. The provided information is tailored based on driver requests. Both one-time requests for information and on-going information streams based on a submitted traveler profile and preferences are supported.	Planned
Connected Vehicle	Light Vehicle OBE	Light Vehicle Payment Service	'Light Vehicle Payment Service' supports vehicle payments including VMT- and zone-based payments and payments for other services including fuel/charging services, tolls, and parking. To support VMT-based payment, this application tracks the location of the vehicle at specific times and reports this VMT data along with vehicle identification. A variety of pricing strategies are supported, including strategies that include credits or incentives that reward desired driving patterns and behavior. The onboard equipment supports secure short range communications with connected vehicle roadside equipment to support secure payments.	Planned
Connected Vehicle	Light Vehicle OBE	Light Vehicle Theft Recovery	'Light Vehicle Theft Recovery' monitors vehicle status changes that indicate potential vehicle theft and shares this status with a service provider. It can also accept a secure command to activate a stolen vehicle recovery radio transmitter to facilitate recovery as well as secure control commands that are intended to slow, stop, or disable a stolen vehicle that jeopardizes public safety.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Connected Vehicle	Light Vehicle OBE	Light Vehicle Trip Planning and Route Guidance	'Light Vehicle Trip Planning and Route Guidance' includes the in-vehicle system that coordinates with a traveler information center to provide a personalized trip plan to the driver. The trip plan is calculated by the Transportation Information Center (TIC) based on preferences and constraints supplied by the driver and provided to the driver for confirmation. Reservations and advanced payment may also be processed to confirm the trip plan. Coordination with the TIC may continue during the trip so that the route plan can be modified to account for new information. Many equipment configurations are possible including in-vehicle systems that provide a basic trip plan to the driver as well as more sophisticated systems that can provide turn by turn guidance to the driver along the route.	
Connected Vehicle	Maint and Constr Vehicle OBE	MCV Barrier System Control	'MCV Barrier System Control' provides local control of automatic or remotely controlled gates and other barrier systems from a maintenance and construction vehicle. This allows maintenance and construction field personnel (e.g., snow plow operators) to open and close gates and other barrier systems without leaving the vehicle, using V2I Communications to control the barriers.	
Connected Vehicle	Maint and Constr Vehicle OBE	MCV Environmental Monitoring	'MCV Environmental Monitoring' collects current road and surface weather conditions from sensors on-board the maintenance and construction vehicle or by querying fixed sensors on or near the roadway. Environmental information including road surface temperature, air temperature, and wind speed is measured and spatially located and time stamped, and reported back to a center.	Planned
Connected Vehicle	Maint and Constr Vehicle OBE	MCV Infrastructure Monitoring	'MCV Infrastructure Monitoring' monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts). It includes vehicle-based sensors that directly monitor the infrastructure, communications that allow roadway-based infrastructure monitoring sensors to be controlled and read, and data communications that allows collected infrastructure condition information to be reported back to a center.	Planned
Connected Vehicle	Maint and Constr Vehicle OBE	MCV METR Emergent Information Dissemination	'MCV METR Emergent Information Dissemination' receives emergent rule information directly from collection function(s) and is responsible for notifying any nearby METR Consumer Systems (e.g., vehicles and PIDs) and the relevant Management Center (TMC/EMC/M&CMC) of the emergent rule status.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Connected Vehicle	Maint and Constr Vehicle OBE	MCV Roadway Maintenance and Construction	'MCV Roadway Maintenance and Construction' includes the on-board systems that support routine non-winter maintenance on a roadway system or right-of-way. Routine maintenance includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, etc.).	Planned
Connected Vehicle	Maint and Constr Vehicle OBE	MCV Vehicle Location Tracking	'MCV Vehicle Location Tracking' monitors vehicle location and reports the position and timestamp information to the dispatch center.	
Connected Vehicle	Maint and Constr Vehicle OBE	MCV Vehicle Safety Monitoring	'MCV Vehicle Safety Monitoring' detects vehicle intrusions in the vicinity of the vehicle and warns crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone. It can be used for stationary work zones or in mobile applications where a safe zone is maintained around the moving vehicle.	Planned
Connected Vehicle	Maint and Constr Vehicle OBE	MCV Work Zone Support	'MCV Work Zone Support' provides communications and support for local management of a work zone. It supports communications between field personnel and the managing center to keep the center apprised of current work zone status. It controls vehicle-mounted driver information systems (e.g., dynamic message signs) and uses short range communications to monitor and control other fixed or portable driver information systems in the work zone.	Planned
Connected Vehicle	Micromobility Vehicle OBE	Micromobility Route Guidance	'Micromobility Route Guidance' includes the on-board system that coordinates with a traveler information center to provide a personalized trip plan to the MMV User.	
Connected Vehicle	Micromobility Vehicle OBE	MMV Access	'MMV Access' provides access to a micromobility vehicle remotely from a center. It also provides the location of the vehicle to the center as well as its identification information to a local traveler device.	
Connected Vehicle	Micromobility Vehicle OBE	MMV Cooperative Information	'MMV Cooperative Information' uses personal-to-vehicle (P2V) communications to share speeds and coordinate maneuvers with adjacent MMVs or VRUs on the same path (a 'string') so other connected devices recognize path predictions with other vulnerable road users in the string, thus improving safety.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Connected Vehicle	Micromobility Vehicle OBE	MMV Safety Communication	'MMV Safety Communication' exchanges the current location and motion information of the MMV with other connected devices in the vicinity, uses that information to calculate traveler and vehicles paths, and warns the traveler when the potential for an impending collision is detected. If available, map data is used to filter and interpret the relative location and motion of connected devices in the vicinity. Information from the infrastructure, e.g., a TIC or CVRE, can be used to detect non-equipped travelers. MMV location and motion broadcasts are also received by the infrastructure and used by the infrastructure to support a wide range of roadside safety and mobility applications	
Connected Vehicle	Vehicle	Vehicle Device Coordination	'Vehicle Device Coordination' coordinates with the personal information device (PID) to transition between modes when the device used by the traveler or personnel no longer needs to broadcast safety and other information as well as when it is time to transition back to the personal device. This function also supports cases in which the PID will serve as the proxy for the vehicle onboard equipment and will act as a bridge to provide the vehicle's status and operating conditions to the PID.	
Connected Vehicle	Vehicle	Vehicle Emissions Monitoring	'Vehicle Emissions Monitoring' directly measures or estimates current and average vehicle emissions and makes this data available to the driver and connected vehicle infrastructure systems.	Planned
Connected Vehicle	Vehicle	Vehicle Gap Assist	'Vehicle Gap Assist' uses V2I communications to collect traffic gap information and associated alerts and warnings that are displayed to the driver who is navigating a stop-sign controlled intersection with a major road.	
Connected Vehicle	Vehicle	Vehicle Location Determination	'Vehicle Location Determination' receives current location of the vehicle and provides this information to vehicle applications that use the location information to provide ITS services.	
Connected Vehicle	Vehicle	Vehicle Safety Monitoring	'Vehicle Safety Monitoring' monitors critical components of the vehicle and warns the driver of safety issues. These capabilities are provided by on-board sensors that monitor vehicle condition and performance, including steering, braking, acceleration, emissions, fuel economy, engine performance, etc. This functional object can also monitor the driver's condition and warn the driver of potential safety issues. It includes sensors and behavior monitoring capabilities that assess the suitability of the driver (e.g., fitness and alertness) to assume or maintain manual control of the vehicle.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Connected Vehicle, Emergency 911 Centers, Emergency Services Functions, GOHSEP, Local Public Safety Agencies, LSP, Motorist Assistance Patrol	ITS Object	ITS Management Support	'ITS Management Support' provides management of the ITS Object. This includes management of regulatory information and policies, management of application processes, management of communication system configuration and update management, communications interfaces, protocol-specific techniques to ensure interoperability such as service advertisements, communications congestion management and interference management, local device states and communications information, billing management, fault management, service level and performance monitoring.	
Connected Vehicle, GOHSEP, Motorist Assistance Patrol	ITS Object	ITS Security Support	'ITS Security Support' provides communications and system security functions to the ITS Object, including privacy protection functions. It may include firewall, intrusion management, authentication, authorization, profile management, identity management, cryptographic key management. It may include a hardware security module and security management information base.	
Connected Vehicle, Motorist Assistance Patrol	Emergency Vehicle OBE	EV Barrier System Control	'EV Barrier System Control' provides local control of automatic or remotely controlled gates and other barrier systems from an emergency vehicle. Using this capability, emergency personnel can open and close barriers without leaving the vehicle, using V2I Communications to control the barriers.	Planned
Connected Vehicle, Motorist Assistance Patrol	Emergency Vehicle OBE	EV METR Emergent Information Dissemination	'EV METR Emergent Information Dissemination' receives emergent rule information directly from collection function(s) and is responsible for notifying any nearby METR Consumer Systems (e.g., vehicles and PIDs) and the relevant Management Center (TMC/EMC/M&CMC) of the emergent rule status.	
Connected Vehicle, Motorist Assistance Patrol	Emergency Vehicle OBE	EV On-Board En Route Support	'EV On-Board En Route Support' provides communications functions to responding emergency vehicles that reduce response times and improve safety of responding public safety personnel and the general public. It supports traffic signal preemption via short range communication directly with signal control equipment and sends alert messages to surrounding vehicles.	Planned



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Connected Vehicle, Motorist Assistance Patrol	Emergency Vehicle OBE	EV On-Board Incident Management Communication	'EV On-board Incident Management Communication' provides communications support to first responders. Information about the incident, information on dispatched resources, and ancillary information such as road and weather conditions are provided to emergency personnel. Emergency personnel transmit information about the incident such as identification of vehicles and people involved, the extent of injuries, hazardous material, resources on site, site management strategies in effect, and current clearance status. Emergency personnel may also send in-vehicle signing messages to approaching traffic using short range communications.	Planned
Connected Vehicle, Motorist Assistance Patrol	Emergency Vehicle OBE	EV On-Board Radio Direction Finding	'EV On-Board Radio Direction Finding' monitors signal strength to establish a bearing to a radio transmitter on a vehicle that needs to be tracked and recovered because it is stolen. Using triangulation, radio direction finding techniques are used to locate the vehicle.	
Connected Vehicle, Motorist Assistance Patrol	Emergency Vehicle OBE	EV On-Board Safety Monitoring	'EV On-Board Safety Monitoring' detects vehicle intrusions in the vicinity of the vehicle and warns emergency personnel of imminent encroachment. Personnel movements in the vicinity of the vehicle are also monitored so that the personnel can be warned of movement beyond a designated safe zone.	
Connected Vehicle, Motorist Assistance Patrol	Emergency Vehicle OBE	EV Service Patrol Vehicle Operations	'EV Service Patrol Vehicle Operations' provides on-board processing and communications to service patrol vehicles that reduce response times and improve safety of responding personnel. It supports service patrol vehicle dispatch and provides incident information back to the dispatching center.	Planned
Connected Vehicle, Motorist Assistance Patrol	Vehicle	Vehicle Basic Safety Communication	'Vehicle Basic Safety Communication' exchanges current vehicle location and motion information with other vehicles in the vicinity, uses that information to calculate vehicle paths, and warns the driver when the potential for an impending collision is detected. If available, map data is used to filter and interpret the relative location and motion of vehicles in the vicinity. Information from on-board sensors (e.g., radars and image processing) are also used, if available, in combination with the V2V communications to detect non-equipped vehicles and corroborate connected vehicle data. Vehicle location and motion broadcasts are also received by the infrastructure and used by the infrastructure to support a wide range of roadside safety and mobility applications. This object represents a broad range of implementations ranging from basic Vehicle Awareness Devices that only broadcast vehicle location and motion and provide no driver warnings to advanced integrated safety systems that may, in addition to warning the driver, provide collision warning information to support automated control functions that can support control intervention.	Planned



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Connected Vehicle, Motorist Assistance Patrol	Vehicle	Vehicle Control Automation	'Vehicle Control Automation' provides lateral and/or longitudinal control of a vehicle to allow 'hands off' and/or 'feet off' driving, automating the steering, accelerator, and brake control functions. It builds on the sensors included in 'Vehicle Safety Monitoring' and 'Vehicle Control Warning' and uses the information about the area surrounding the vehicle to safely control the vehicle. It covers the range of incremental control capabilities from driver assistance systems that take over steering or acceleration/deceleration in limited scenarios with direct monitoring by the driver to full automation where all aspects of driving are automated under all roadway and environmental conditions.	
Connected Vehicle, Motorist Assistance Patrol	Vehicle	Vehicle Control Warning	'Vehicle Control Warning' monitors areas around the vehicle and provides warnings to a driver so the driver can take action to recover and maintain safe control of the vehicle. It includes lateral warning systems that warn of lane departures and obstacles or vehicles to the sides of the vehicle and longitudinal warning systems that monitor areas in the vehicle path and provide warnings when headways are insufficient or obstacles are detected in front of or behind the vehicle. It includes on-board sensors, including radars and imaging systems, and the driver information system that provides the visual, audible, and/or haptic warnings to the driver.	
Connected Vehicle, Motorist Assistance Patrol	Vehicle	Vehicle Cooperative Cruise Control	'Vehicle Cooperative Cruise Control' uses V2V communications to share speeds and coordinate maneuvers with adjacent vehicles in the same lane (a CACC 'string'), maintaining vehicle speed and a safe gap with the predecessor vehicle. It provides the capability for vehicles to cluster into strings of CACC-equipped vehicles with compatible performance characteristics and share speed, location, acceleration/deceleration, path predictions (e.g., intended acceleration/deceleration) with other vehicles in the string. These capabilities are provided by systems on board the vehicle that coordinate with other vehicles and control acceleration and braking. In advanced implementations, the capability to coordinate with the infrastructure to support more advanced clustering strategies and use infrastructure provided target speed and traffic control information to improve performance.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Connected Vehicle, Motorist Assistance Patrol	Vehicle	Vehicle Eco-Driving Assist	'Vehicle Eco-Driving Assist' provides customized real-time driving advice to drivers, allowing them to adjust behaviors to save fuel and reduce emissions. This advice includes recommended driving speeds, optimal acceleration and deceleration profiles based on prevailing traffic conditions, and local interactions with nearby vehicles, i.e., processing Basic Safety Messages (BSMs) to determine position and speed of vehicles that are between the host vehicle and the intersection. When approaching and departing signalized intersections, it uses intersection geometry information, the relative position and speed of vehicles ahead of it, and signal phase movement information to provide speed advice to the driver so that the driver can adapt the vehicle's speed to pass the next traffic signal on green, decelerate to a stop in the most eco-friendly manner, or manage acceleration as the vehicle departs from a signalized intersection. It also provides feedback to drivers on their driving behavior to encourage them to drive in a more environmentally efficient manner. It may also support vehicle-assisted strategies, where the vehicle automatically implements the eco-driving strategy (e.g., changes gears, switches power sources, or reduces its speed in an eco-friendly manner as the vehicle approaches a traffic signal or queue).	
Connected Vehicle, Motorist Assistance Patrol	Vehicle	Vehicle Emergency Notification	'Vehicle Emergency Notification' provides the capability for drivers or collision detection sensors to report an emergency and summon assistance. It gathers data from on-board collision detection sensors, provides a mechanism for the driver to summon assistance, and includes a communications capability to report the collision including indicators of collision severity, the number of passengers involved, and information about the vehicle that may affect the response.	
Connected Vehicle, Motorist Assistance Patrol	Vehicle	Vehicle Environmental Monitoring	'Vehicle Environmental Monitoring' collects data from on-board sensors and systems related to environmental conditions and sends the collected data to the infrastructure as the vehicle travels. The collected data is a byproduct of vehicle safety and convenience systems and includes ambient air temperature and precipitation measures and status of the wipers, lights, ABS, and traction control systems.	Planned
Connected Vehicle, Motorist Assistance Patrol	Vehicle	Vehicle Intersection Warning	'Vehicle Intersection Warning' uses V2V and V2I communications to monitor other connected vehicles at intersections and support the safe movement of the vehicle through the intersection. Driver warnings are provided and the application may also optionally take control of the vehicle to avoid collisions. The application will also notify the infrastructure and other vehicles if it detects an unsafe infringement on the intersection.	Planned



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Connected Vehicle, Motorist Assistance Patrol	Vehicle	Vehicle Platoon Operations	'Vehicle Platoon Operations' provides the capability for vehicles to operate in cooperative platoons with short fixed gaps and a designated lead vehicle. These capabilities are provided by systems on board the vehicle that coordinate with other vehicles and regulate acceleration and braking and provide higher-level functions that enable vehicles to join and depart from vehicle platoons.	
Connected Vehicle, Motorist Assistance Patrol	Vehicle	Vehicle Queue Warning	'Vehicle Queue Warning' detects vehicle queues and reports queues to other vehicles using V2V communications and to the infrastructure using V2I communications. Vehicle-based queue warning builds on the exchange of vehicle location and motion and maneuvers that supports connected vehicle safety applications. This application also receives information about downstream queues using I2V communications. Individualized queue warnings and queue characteristics relevant to the vehicle are provided to the driver.	
Connected Vehicle, Motorist Assistance Patrol	Vehicle	Vehicle Restricted Lanes Application	The 'Vehicle Restricted Lanes Application' monitors and reports its own operating parameters and communicates with roadside equipment to safely enter, operate within, and exit restricted lanes that are relevant to all types of vehicles.	
Connected Vehicle, Motorist Assistance Patrol	Vehicle	Vehicle Situation Data Monitoring	'Vehicle Situation Data Monitoring' is the highest-level representation of the functionality required to collect traffic and environmental situation data by monitoring and storing the experience of the vehicle as it travels through the road network. Collected data is aggregated into snapshots that are reported when communications is available and with flow control based on parameters provided by the infrastructure. Note that this functional object supports collection of data for areas remote from RSEs or other communications infrastructure.	
Connected Vehicle, Motorist Assistance Patrol	Vehicle	Vehicle Speed Management Assist	'Vehicle Speed Management Assist' assists the driver in operating the vehicle within the current speed limit. It monitors current vehicle speed and communicates with the infrastructure to receive current speed limits and associated road configuration change notifications. Driver warnings are issued when unsafe or excessive speeds are detected based on the provided speed limits and current conditions.	
Connected Vehicle, Motorist Assistance Patrol	Vehicle	Vehicle Support Services	'Vehicle Support Services' provides foundational functions that support data collection, management, and distribution. It coordinates with Support subsystems to maintain necessary registrations with respect to location and scope.	



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Connected Vehicle, Motorist Assistance Patrol	Vehicle	Vehicle Traveler Information Reception	'Vehicle Traveler Information Reception' receives advisories, vehicle signage data, and other driver information of use to all types of vehicles and drivers and presents this information to the driver using in-vehicle equipment. Information presented may include fixed sign information, traffic control device status (e.g., signal phase and timing data), advisory and detour information, warnings of adverse road and weather conditions, travel times, and other driver information.	Planned
CVO Inspection Stations	ITS Roadway Equipment	Roadway Data Collection	'Roadway Data Collection' collects traffic, road, and environmental conditions information for use in transportation planning, research, and other off-line applications where data quality and completeness take precedence over real-time performance. It includes the sensors, supporting roadside infrastructure, and communications equipment that collects and transfers information to a center for archival.	Existing
CVO Inspection Stations, ITS Field Equipment, LADOTD Flood Warning Systems, Traffic Signal Systems, Workzone ITS	Connected Vehicle Roadside Equipment	RSE Automated Vehicle Operations	'RSE Automated Vehicle Operations' includes the field elements that monitor and control access to and egress from automated lanes. It monitors and coordinates automated vehicle operations within the lanes. These lanes support vehicles operating in platoons with short headways.	
CVO Inspection Stations, ITS Field Equipment, LADOTD Flood Warning Systems, Traffic Signal Systems, Workzone ITS	Connected Vehicle Roadside Equipment	RSE Device Management	'RSE Device Management' provides executive control and monitoring of the RSE hardware and installed software applications. It monitors the operational status of the hardware and other attached field devices and detects and reports fault conditions. A back office interface supports application installation, upgrade, and configuration as well as remote control of the operating mode and hardware configuration settings and initiation of remote diagnostics. A local interface is provided to field personnel for local monitoring and diagnostics, supporting field maintenance, repair, and replacement.	
CVO Inspection Stations, ITS Field Equipment, LADOTD Flood Warning Systems, Traffic Signal Systems, Workzone ITS	Connected Vehicle Roadside Equipment	RSE Infrastructure Monitoring	'RSE Infrastructure Monitoring' collects environmental situation (probe) data from passing vehicles that are equipped with short range communications capability with particular focus on measures that may indicate infrastructure condition. The collected data includes current environmental conditions as measured by on-board sensors (e.g., ambient temperature and precipitation measures) and current status of vehicle systems that can be used to infer infrastructure condition (e.g., status of ABS, traction control systems, vertical acceleration measures) as reported by the vehicle. This functional object also supports short range communications with maintenance and construction vehicles, providing local control and monitoring of infrastructure sensors.	



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CVO Inspection Stations, LADOTD District Traffic Operations, LADOTD ITS Section 56	Center	Center Field Equipment Management	'Center Field Equipment Management' is the back office application that supports monitoring and maintenance of field equipment. It monitors the performance and configuration of the field equipment. This includes management of the infrastructure configuration as well as detection, isolation, and correction of field equipment problems. The application also includes monitoring of performance of the field equipment, including communications links.	
DEQ	Emissions Management Center	Emissions Data Management	'Emissions Data Management' collects and stores air quality and vehicle emissions information by remotely monitoring and controlling area wide and point sensors. General air quality measures are distributed as general traveler information and also may be used in demand management programs. Collected roadside emissions are analyzed and used to detect, identify, and notify concerned parties regarding vehicles that exceed emissions standards.	Existing
Emergency 911 Centers	Emergency Vehicle OBE	EV On-Board En Route Support	'EV On-Board En Route Support' provides communications functions to responding emergency vehicles that reduce response times and improve safety of responding public safety personnel and the general public. It supports traffic signal preemption via short range communication directly with signal control equipment and sends alert messages to surrounding vehicles.	
Emergency 911 Centers	Emergency Vehicle OBE	EV On-Board Incident Management Communication	'EV On-board Incident Management Communication' provides communications support to first responders. Information about the incident, information on dispatched resources, and ancillary information such as road and weather conditions are provided to emergency personnel. Emergency personnel transmit information about the incident such as identification of vehicles and people involved, the extent of injuries, hazardous material, resources on site, site management strategies in effect, and current clearance status. Emergency personnel may also send in-vehicle signing messages to approaching traffic using short range communications.	Existing
Emergency 911 Centers	Emergency Vehicle OBE	EV Service Patrol Vehicle Operations	'EV Service Patrol Vehicle Operations' provides on-board processing and communications to service patrol vehicles that reduce response times and improve safety of responding personnel. It supports service patrol vehicle dispatch and provides incident information back to the dispatching center.	



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Emergency 911 Centers, Emergency Services Functions, GOHSEP, HAZMAT Mobile Response, LADOTD District Traffic Operations, Local Emergency Services, Local Public Safety Agencies, LSP	Emergency Management Center	Emergency Response Management	'Emergency Response Management' provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. It develops and stores emergency response plans and manages overall coordinated response to emergencies. It monitors real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. It also provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It also coordinates with the public through the Emergency Telecommunication Systems (e.g., Reverse 911). It coordinates with public health systems to provide the most appropriate response for emergencies involving biological or other medical hazards.	Existing
Emergency 911 Centers, Emergency Services Functions, Local Public Safety Agencies	Emergency Management Center	Emergency Early Warning System	'Emergency Early Warning System' monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies and uses this information to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to initiate the emergency response, including public notification using ITS traveler information systems, where appropriate.	Existing
Emergency 911 Centers, GOHSEP	Emergency Management Center	Emergency Data Collection	'Emergency Data Collection' collects and stores emergency information that is collected in the course of operations by the Emergency Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.	Existing



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Emergency 911 Centers, GOHSEP, Local Public Safety Agencies, LSP	Emergency Management Center	Emergency Secure Area Sensor Management	'Emergency Secure Area Sensor Management' manages sensors that monitor secure areas in the transportation system, processes the collected data, performs threat analysis in which data is correlated with other sensor, surveillance, and advisory inputs, and then disseminates resultant threat information to emergency personnel and other agencies. In response to identified threats, the operator may request activation of barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. The sensors may be in secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. The types of sensors include acoustic, threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity, motion and object sensors.	
Emergency 911 Centers, GOHSEP, Local Public Safety Agencies, LSP	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.	
Emergency 911 Centers, LADOTD District Traffic Operations, Local Public Safety Agencies, LSP, TMC	Emergency Management Center	Emergency Environmental Monitoring	'Emergency Environmental Monitoring' collects current and forecast road conditions and surface weather information from a variety of sources. The collected environmental information is monitored and presented to the operator and used to more effectively manage incidents.	
Emergency 911 Centers, Local Public Safety Agencies	Emergency Management Center	Emergency Call-Taking	'Emergency Call-Taking' supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other objects that formulate and manage the emergency response. It receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.	



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Emergency 911 Centers, Local Public Safety Agencies	Emergency Management Center	Emergency Dispatch	'Emergency Dispatch' tracks the location and status of emergency vehicles and dispatches these vehicles to incidents. Pertinent incident information is gathered from the public and other public safety agencies and relayed to the responding units. Incident status and the status of the responding units is tracked so that additional units can be dispatched and/or unit status can be returned to available when the incident is cleared and closed.	
Emergency 911 Centers, TMC	Emergency Management Center	Emergency Routing	'Emergency Routing' supports routing of emergency vehicles and enlists support from the Traffic Management Center to facilitate travel along these routes. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by the Traffic Management Center on request. Vehicles are tracked and routes are based on current vehicle location. It may coordinate with the Traffic Management Center to provide preemption or otherwise adapt the traffic control strategy along the selected route.	
Emergency Services Functions	Emergency Management Center	Emergency Secure Area Sensor Management	'Emergency Secure Area Sensor Management' manages sensors that monitor secure areas in the transportation system, processes the collected data, performs threat analysis in which data is correlated with other sensor, surveillance, and advisory inputs, and then disseminates resultant threat information to emergency personnel and other agencies. In response to identified threats, the operator may request activation of barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. The sensors may be in secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. The types of sensors include acoustic, threat (e.g. chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity, motion and object sensors.	Existing
Emergency Services Functions	Emergency Management Center	Emergency Secure Area Surveillance	'Emergency Secure Area Surveillance' monitors surveillance inputs from secure areas in the transportation system. The surveillance may be of secure areas frequented by travelers (i.e., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.) or around transportation infrastructure such as bridges, tunnels and transit railways or guideways. It provides both video and audio surveillance information to emergency personnel and automatically alerts emergency personnel of potential incidents.	Existing



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Emergency Services Functions, GOHSEP	Emergency Management Center	Emergency Environmental Monitoring	'Emergency Environmental Monitoring' collects current and forecast road conditions and surface weather information from a variety of sources. The collected environmental information is monitored and presented to the operator and used to more effectively manage incidents.	Existing
GNOEC/LADOTD	Payment Administration Center	PAC Payment Administration	'PAC Payment Administration' provides administration and management of payments associated with electronic toll collection, parking payments, and other e-payments. It provides the back office functions that support enrollment, pricing, reduced fare eligibility, payment reconciliation with financial institutions, and violation notification to enforcement agencies. It also supports dynamic pricing to support demand management, allow/block-list management and token validation.	
GOHSEP	Security Monitoring Equipment	Field Secure Area Sensor Monitoring	'Field Secure Area Sensor Monitoring' includes sensors that monitor conditions of secure areas including facilities (e.g. transit yards), transportation infrastructure (e.g. Bridges, tunnels, interchanges, and transit railways or guideways), and public areas (e.g., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities). A range of acoustic, environmental threat (e.g. Chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors), infrastructure condition and integrity and motion and object sensors are included.	
GOHSEP	Security Monitoring Equipment	Field Secure Area Surveillance	'Field Secure Area Surveillance' includes video and audio surveillance equipment that monitors conditions of secure areas including facilities (e.g. transit yards), transportation infrastructure (e.g. as bridges, tunnels, interchanges, and transit railways or guideways), and public areas (e.g., transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities). It provides the surveillance information to the Emergency Management Center for possible threat detection. It also provides local processing of the video or audio information, providing processed or analyzed results to the Emergency Management Center.	
GOHSEP	Transportation Information Center	TIC Data Collection	'TIC Data Collection' collects transportation-related data from other centers, performs data quality checks on the collected data and then consolidates, verifies, and refines the data and makes it available in a consistent format to applications that support operational data sharing between centers and deliver traveler information to end-users. A broad range of data is collected including traffic and road conditions, transit data, emergency information and advisories, weather data, special event information, traveler services, parking, multimodal data, and toll/pricing data. It also shares data with other transportation information centers.	Existing



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
GOHSEP, HAZMAT Mobile Response, LADOTD District Traffic Operations, Local Emergency Services, Local Public Safety Agencies, TMC	Emergency Management Center	Emergency Notification Support	'Emergency Notification Support' receives emergency notification messages from vehicles or personal handheld devices, determines an appropriate response, and either uses internal resources or contacts a local agency to provide that response. The nature of the emergency is determined based on the information in the received message as well as other inputs. This object effectively serves as an interface between automated collision notification systems and the local public safety answering point for messages that require a public safety response. This capability depends on an up-to-date registry of public safety answering points/response agencies by coverage area, the type of emergency, and hours of service.	
GOHSEP, LADOTD District Traffic Operations, Media, TMC	Transportation Information Center	TIC Traveler Telephone Information	'TIC Traveler Telephone Information' services voice-based traveler requests for information that supports traveler telephone information systems like 511. It takes requests for traveler information, which could be voice-formatted traveler requests, dual-tone multi-frequency (DTMF)-based requests, or a simple traveler information request, and returns the requested traveler information in the proper format. In addition to servicing requests for traveler information, it also collects and forwards alerts and advisories to traveler telephone information systems.	
GOHSEP, LADOTD District Traffic Operations, TMC	Transportation Information Center	TIC Operations Data Collection	'TIC Operations Data Collection' collects and stores information that is collected about the transportation information service including data on the number of clients serviced and the services that were provided. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.	
GOHSEP, LSP, TMC	Emergency Management Center	Emergency Early Warning System	'Emergency Early Warning System' monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies and uses this information to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to initiate the emergency response, including public notification using ITS traveler information systems, where appropriate.	
ITS Field Equipment	Connected Vehicle Roadside Equipment	RSE Traffic Metering	'RSE Traffic Metering' uses V2I communications to support ramp metering and other traffic metering applications. Data is collected from connected vehicles on both the mainline and approach to the traffic meters. The collected data is processed and filtered and provided to the metering controller. Status and current signal indications from the ramp meter are also collected and provided to approaching and queued connected vehicles.	
ITS Field Equipment	ITS Roadway Equipment	Roadway Basic Surveillance	'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment such as loop detectors and CCTV cameras.	Existing



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
ITS Field Equipment	ITS Roadway Equipment	Roadway Infrastructure Monitoring	'Roadway Infrastructure Monitoring' monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts). It includes sensors that monitor the infrastructure and the communications necessary to report this data to a center or vehicle-based maintenance system.	Existing
ITS Field Equipment	ITS Roadway Equipment	Roadway Reversible Lanes	'Roadway Reversible Lanes' includes field elements that monitor and control reversible lane facilities. It includes the traffic sensors, surveillance equipment, lane control signals, physical lane access controls, and other field elements that manage traffic on these facilities. It provides current reversible lane facility status information and accepts requests and control commands from the controlling center.	
ITS Field Equipment	ITS Roadway Equipment	Roadway Work Zone Safety	'Roadway Work Zone Safety' includes field elements that detect vehicle intrusions in work zones and warns crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone.	
ITS Field Equipment, LADOTD Flood Warning Systems	ITS Roadway Equipment	Roadway Environmental Monitoring	'Roadway Environmental Monitoring' measures environmental conditions and communicates the collected information back to a center where it can be monitored and analyzed or to other field devices to support communications to vehicles. A broad array of weather and road surface information may be collected. Weather conditions that may be measured include temperature, wind, humidity, precipitation, and visibility. Surface and sub-surface sensors can measure road surface temperature, moisture, icing, salinity, and other metrics.	Existing
ITS Field Equipment, Toll Plaza, Traffic Signal Systems, Workzone ITS	Field	Field System Executive	'Field System Executive' includes the operating system kernel and executive functions that manage the overall device software configuration and operation and support configuration management, computer resource management, and govern software installation and upgrade.	
ITS Field Equipment, Traffic Signal Systems	Connected Vehicle Roadside Equipment	RSE Traffic Gap Assist	'RSE Traffic Gap Assist' provides advisory information to minor road drivers at a stop-sign controlled intersection to facilitate gap selection to proceed through the intersection. The application can be configured depending on the intersection geometry. It monitors Connected Vehicle traffic on the major road, augmenting infrastructure traffic detectors, to identify and measure traffic gaps. The intersection geometry, measured traffic gaps, and current gap assist sign displays are communicated to the connected vehicle that is navigating the intersection for use in driver advisories and warnings. The application may also collect vehicle size and performance profile from the connected vehicle to optimize the alerts and warnings to the capabilities of the vehicle and driver preferences.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
ITS Field Equipment, Traffic Signal Systems, Workzone ITS	Connected Vehicle Roadside Equipment	RSE Intersection Management	'RSE Intersection Management' uses short range communications to support connected vehicle applications that manage signalized intersections. It communicates with approaching vehicles and ITS infrastructure (e.g., the traffic signal controller) to enhance traffic signal operations. Coordination with the ITS infrastructure also supports conflict monitoring to ensure the RSE output and traffic signal control output are consistent and degrade in a fail safe manner.	
ITS Field Equipment, Traffic Signal Systems, Workzone ITS	Connected Vehicle Roadside Equipment	RSE Intersection Safety	'RSE Intersection Safety' uses short range communications to support connected vehicle applications that improve intersection safety. It communicates with approaching vehicles and ITS infrastructure to alert and warn drivers of potential stop sign, red light, and non-motorized user crossing conflicts or violations.	
ITS Field Equipment, Workzone ITS	Connected Vehicle Roadside Equipment	RSE Queue Warning	'RSE Queue Warning' provides V2I communications to support queue warning systems. It monitors connected vehicles to identify and monitor queues in real-time and provides information to vehicles about upcoming queues, including downstream queues that are reported by the Traffic Management Center.	
ITS Field Equipment, Workzone ITS	Connected Vehicle Roadside Equipment	RSE Speed Management	'RSE Speed Management' provides infrastructure information including road grade, roadway geometry, road weather information, and current speed limits to assist vehicles in maintaining safe speeds and headways. It also provides speed recommendations to vehicles based on current conditions and overall speed limits and strategies established by the back office.	
ITS Field Equipment, Workzone ITS	Connected Vehicle Roadside Equipment	RSE Traffic Monitoring	'RSE Traffic Monitoring' monitors the basic safety messages that are shared between connected vehicles and distills this data into traffic flow measures that can be used to manage the network in combination with or in lieu of traffic data collected by infrastructure-based sensors. As connected vehicle penetration rates increase, the measures provided by this application can expand beyond vehicle speeds that are directly reported by vehicles to include estimated volume, occupancy, and other measures. This object also supports incident detection by monitoring for changes in speed and vehicle control events that indicate a potential incident.	
ITS Field Equipment, Workzone ITS	Connected Vehicle Roadside Equipment	RSE Work Zone Safety	'RSE Work Zone Safety' communicates with Connected Vehicles and Personal Information Devices carried or worn by the work crew to detect vehicle intrusions in work zones and warn crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone.	



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LADOTD District Traffic Operations	Archived Data System	Archive Government Reporting	'Archive Government Reporting' selects and formats data residing in an ITS archive to facilitate local, state, and federal government data reporting requirements. It provides transportation system statistics and performance measures in required formats to support investment and policy decisions.	
LADOTD District Traffic Operations	Maint and Constr Management Center	MCM Environmental Information Processing	'MCM Environmental Information Processing' processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. The processed environmental information products are presented to center personnel and disseminated to other centers.	
LADOTD District Traffic Operations	Maint and Constr Management Center	MCM Incident Management	'MCM Incident Management' supports maintenance and construction participation in coordinated incident response. Incident notifications are shared, incident response resources are managed, and the overall incident situation and incident response status is coordinated among allied response organizations.	
LADOTD District Traffic Operations	Maint and Constr Management Center	MCM Roadway Maintenance	'MCM Roadway Maintenance' provides overall management and support for routine maintenance on a roadway system or right-of-way. Services managed include landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of non-ITS equipment on the roadway (e.g., signs, gantries, cabinets, guard rails, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling routine maintenance activities. See also MCM Field Equipment Maintenance for maintenance of ITS field equipment.	
LADOTD District Traffic Operations	Maint and Constr Management Center	MCM Work Zone Management	'MCM Work Zone Management' remotely monitors and supports work zone activities, controlling traffic through dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers, and informing other groups of activity (e.g., traveler information, traffic management, other maintenance and construction centers) for better coordination management. Work zone speeds, and delays, and closures are provided to the motorist prior to the work zones. This application provides control of field equipment in all maintenance areas, including fixed and portable field equipment supporting both stationary and mobile work zones.	
LADOTD District Traffic Operations	Maint and Constr Management Center	MCM Work Zone Safety Management	'MCM Work Zone Safety Management' remotely monitors work zone safety systems that detect vehicle intrusions in work zones and warns crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
LADOTD District Traffic Operations	Traffic Management Center	TMC Environmental Monitoring	'TMC Environmental Monitoring' assimilates current and forecast road conditions and surface weather information using a combination of weather service provider information, information collected by other centers such as the Maintenance and Construction Management Center, data collected from environmental sensors deployed on and about the roadway, and information collected from connected vehicles. The collected environmental information is monitored and presented to the operator. This information can be used to issue general traveler advisories and support location specific warnings to drivers.	Planned
LADOTD District Traffic Operations	Traffic Management Center	TMC Incident Detection	'TMC Incident Detection' identifies and reports incidents to Traffic Operations Personnel. It remotely monitors and controls traffic sensor and surveillance systems that support incident detection and verification. It analyzes and reduces the collected sensor and surveillance data, external alerting and advisory and incident reporting systems, anticipated demand information from intermodal freight depots, border crossings, special event information, and identifies and reports incidents and hazardous conditions	Existing
LADOTD District Traffic Operations	Traffic Management Center	TMC Traffic Information Dissemination	'TMC Traffic Information Dissemination' disseminates traffic and road conditions, closure and detour information, incident information, driver advisories, and other traffic-related data to other centers, the media, and driver information systems. It monitors and controls driver information system field equipment including dynamic message signs and highway advisory radio, managing dissemination of driver information through these systems.	Existing



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
LADOTD District Traffic Operations	Traffic Management Center	TMC Traffic Management Decision Support	'TMC Traffic Management Decision Support' recommends courses of action to the traffic operator based on current and forecast road and traffic conditions. Traffic incidents, special events, maintenance activities and other events or conditions that impact capacity or demand are monitored. Historical data and models are used to compare the impact of potential courses of action and make recommendations to the operator. Decisions are supported through presentation of filtered and fused network-wide road and traffic conditions that identify network imbalances and recommended courses of action. The recommended actions may include predefined incident response plans, signal timing plan changes, DMS/HAR messages, truck restrictions, lane control strategies, metering strategies, and adjustment of variable speed limits. Multimodal strategies may also be recommended that include suggested transit strategies and suggested route and mode choices for travelers. Once a course of action is selected, traffic operations personnel implement these actions within the Traffic Management Center and coordinate the response with other centers in the region.	Existing
LADOTD District Traffic Operations	Traffic Management Center	TMC Traffic Network Performance Evaluation	'TMC Traffic Network Performance Evaluation' measures traffic network performance and predicts travel demand patterns to support traffic flow optimization, demand management, and incident management. It collects traffic data from sensors and surveillance equipment as well as input from other Traffic Management Centers, emissions management, transit operations, and event promoters and uses this information to measure traffic network performance. It collects route planning information from transportation information centers and integrates and uses this information to predict future traffic conditions. The planned control strategies can be passed back to the transportation information center so that the intended strategies can be reflected in future route planning.	Existing, Planned
LADOTD District Traffic Operations	Traffic Management Center	TMC Work Zone Traffic Management	'TMC Work Zone Traffic Management' coordinates work plans with maintenance systems so that work zones are established that have minimum traffic impact. Traffic control strategies are implemented to further mitigate traffic impacts associated with work zones that are established, providing work zone information to driver information systems such as dynamic message signs.	Existing, Planned



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
LADOTD District Traffic Operations, LADOTD ITS Section 56	Archived Data System	Archive Data Repository	'Archive Data Repository' collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. It includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. It includes the capability to define a data registry that allows registration of data identifiers or data definitions for interoperable use throughout a region. It supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region. Repositories may be established to support operations planning, performance monitoring and management, and policy and investment decisions.	
LADOTD District Traffic Operations, LADOTD ITS Section 56	Maint and Constr Management Center	MCM Data Collection	'MCM Data Collection' collects and stores maintenance and construction information that is collected in the course of operations by the Maintenance and Construction Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.	
LADOTD District Traffic Operations, LADOTD ITS Section 56	Maint and Constr Management Center	MCM Infrastructure Monitoring	'MCM Infrastructure Monitoring' monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts). It monitors the infrastructure, collecting data from both fixed and vehicle-based sensors. In addition to specialized infrastructure monitoring sensors, it also monitors the broader population of equipped vehicles for vertical acceleration data and other situation data that may be used to determine current pavement condition.	
LADOTD District Traffic Operations, LADOTD ITS Section 56	Maint and Constr Management Center	MCM Work Activity Coordination	'MCM Work Activity Coordination' disseminates work activity schedules and current asset restrictions to other agencies. Work schedules are coordinated with operating agencies, factoring in the needs and activities of other agencies and adjacent jurisdictions. Work schedules are also distributed to Transportation Information Centers for dissemination to the traveling public.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
LADOTD District Traffic Operations, LADOTD ITS Section 56, Local Planning Organizations, TMC	Archived Data System	Archive Situation Data Archival	'Archive Situation Data Archival' collects and archives traffic, roadway, and environmental information for use in off-line planning, research, and analysis. It controls and collects information directly from equipment at the roadside, reflecting the deployment of traffic detectors that are used primarily for traffic monitoring and planning purposes, rather than for traffic management. It also collects situation data from connected vehicles. The data collected, quality checks performed, and aggregation strategies are defined to support transportation system performance monitoring and management.	
LADOTD District Traffic Operations, LADOTD ITS Section 56, TMC	Emergency Management Center	Emergency Data Collection	'Emergency Data Collection' collects and stores emergency information that is collected in the course of operations by the Emergency Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.	
LADOTD District Traffic Operations, Local Planning Organizations	Archived Data System	Archive On-Line Analysis and Mining	'Archive On-Line Analysis and Mining' provides advanced data analysis, summarization, and mining features that facilitate discovery of information, patterns, and correlations in large data sets. Multidimensional analysis, selective summarization and expansion of data details, and many other advanced analysis services may be offered. Complex performance measures that are derived from multiple data sources may also be produced.	
LADOTD District Traffic Operations, LSP	Traffic Management Center	TMC Incident Dispatch Coordination	'TMC Incident Dispatch Coordination' formulates and manages an incident response that takes into account the incident potential, incident impacts, and resources required for incident management. It provides information to support dispatch and routing of emergency response and service vehicles as well as coordination with other cooperating agencies. It provides access to traffic management resources that provide surveillance of the incident, traffic control in the surrounding area, and support for the incident response. It monitors the incident response and collects performance measures such as incident response and clearance times.	Existing
LADOTD District Traffic Operations, TMC	ITS Object	ITS Data Subscription Management	'ITS Data Subscription Management' manages data subscriptions for an end user. It provides access to a catalog of available data, manages the necessary user information and rules that govern the data subscriptions, supports communications with data providers to collect data per the subscription rules, and makes the data available to the end user. It provides the local user interface through which a user can specify and manage subscriptions. It supports different mechanisms for collecting subscribed data for the end-user including one-time query-response as well as publish-subscribe services.	



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LADOTD District Traffic Operations, TMC	Traffic Management Center	TMC Demand Management Coordination	'TMC Demand Management Coordination' provides the capability to gather information on regional toll, parking, and transit usage and request changes to pricing and other mechanisms to manage overall transportation demand.	
LADOTD District Traffic Operations, TMC	Traffic Management Center	TMC Reversible Lane Management	'TMC Reversible Lane Management' remotely monitors and controls reversible lanes. It provides an interface to reversible lane field equipment (traffic sensors, surveillance equipment, lane control signals, physical lane access controls, etc.) and to traffic operations personnel to support central monitoring and control of these facilities.	
LADOTD ITS Section 56	Maint and Constr Management Center	MCM Incident Management	'MCM Incident Management' supports maintenance and construction participation in coordinated incident response. Incident notifications are shared, incident response resources are managed, and the overall incident situation and incident response status is coordinated among allied response organizations.	Existing
LADOTD ITS Section 56, LADOTD District Traffic Operations	Traffic Management Center	TMC Basic Surveillance	'TMC Basic Surveillance' remotely monitors and controls traffic sensor systems and surveillance (e.g., CCTV) equipment, and collects, processes and stores the collected traffic data. Current traffic information and other real-time transportation information is also collected from other centers. The collected information is provided to traffic operations personnel and made available to other centers.	Existing
LADOTD ITS Section 56, LADOTD District Traffic Operations	Traffic Management Center	TMC Evacuation Support	'TMC Evacuation Support' supports development, coordination, and execution of special traffic management strategies during evacuation and subsequent reentry of a population in the vicinity of a disaster or major emergency. A traffic management strategy is developed based on anticipated demand, the capacity of the road network including access to and from the evacuation routes, and existing and forecast conditions. The strategy supports efficient evacuation and also protects and optimizes movement of response vehicles and other resources that are responding to the emergency.	Existing
LADOTD ITS Section 56, LADOTD District Traffic Operations	Traffic Management Center	TMC Regional Traffic Management	'TMC Regional Traffic Management' supports coordination between Traffic Management Centers in order to share traffic information between centers as well as control of traffic management field equipment. This coordination supports wide area optimization and regional coordination that spans jurisdictional boundaries; for example, coordinated signal control in a metropolitan area or coordination between freeway operations and arterial signal control within a corridor.	Existing



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
LADOTD ITS Section 56, LADOTD District Traffic Operations	Traffic Management Center	TMC Roadway Equipment Monitoring	'TMC Roadway Equipment Monitoring' monitors the operational status of field equipment and detects failures. It presents field equipment status to Traffic Operations Personnel and reports failures to the Maintenance and Construction Management Center. It tracks the repair or replacement of the failed equipment. The entire range of ITS field equipment may be monitored including sensors (traffic, infrastructure, environmental, security, speed, etc.) and devices (highway advisory radio, dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, beacons, security surveillance equipment, etc.).	Existing
LADOTD ITS Section 56, LADOTD District Traffic Operations	Traffic Management Center	TMC Signal Control	'TMC Signal Control' provides the capability for traffic managers to monitor and manage the traffic flow at signalized intersections. This capability includes analyzing and reducing the collected data from traffic surveillance equipment and developing and implementing control plans for signalized intersections. Control plans may be developed and implemented that coordinate signals at many intersections under the domain of a single Traffic Management Center and are responsive to traffic conditions and adapt to support incidents, preemption and priority requests, pedestrian crossing calls, etc.	Existing
LADOTD ITS Section 56, LADOTD District Traffic Operations	Traffic Management Center	TMC Traffic Metering	'TMC Traffic Metering' provides center monitoring and control of traffic metering systems including on ramps, through interchanges, and on the mainline roadway. All types of metering are covered including pre-timed/fixed time, time-based, dynamic and adaptive metering strategies and special bypasses. Metering rates can be calculated based upon historical data or current conditions including traffic, air quality, etc.	Existing
LADOTD ITS Section 56, LADOTD District Traffic Operations, TMC	Traffic Management Center	TMC Data Collection	'TMC Data Collection' collects and stores information that is created in the course of traffic operations performed by the Traffic Management Center. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
LADOTD ITS Section 56, TMC	Emergency Management Center	Emergency Response Management	'Emergency Response Management' provides the strategic emergency response capabilities and broad inter-agency interfaces that are implemented for extraordinary incidents and disasters that require response from outside the local community. It provides the functional capabilities and interfaces commonly associated with Emergency Operations Centers. It develops and stores emergency response plans and manages overall coordinated response to emergencies. It monitors real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. It also provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It also coordinates with the public through the Emergency Telecommunication Systems (e.g., Reverse 911). It coordinates with public health systems to provide the most appropriate response for emergencies involving biological or other medical hazards.	
LADOTD ITS Section 56, TMC	Traffic Management Center	TMC Work Zone Traffic Management	'TMC Work Zone Traffic Management' coordinates work plans with maintenance systems so that work zones are established that have minimum traffic impact. Traffic control strategies are implemented to further mitigate traffic impacts associated with work zones that are established, providing work zone information to driver information systems such as dynamic message signs.	
LADOTD Social Media, Event Promoter, Louisiana 511 Website, Media	Transportation Information Center	TIC Traveler Information Broadcast	'TIC Traveler Information Broadcast' disseminates traveler information including traffic and road conditions, incident information, maintenance and construction information, event information, transit information, parking information, and weather information. The same information is broadcast to all equipped traveler interface systems and vehicles.	Existing



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LADOTD Social Media, GOHSEP, LADOTD District Traffic Operations, TMC	Transportation Information Center	TIC Emergency Traveler Information	'TIC Emergency Traveler Information' provides emergency information to the public, including wide-area alerts and evacuation information. It provides emergency alerts, information on evacuation zones and evacuation requirements, evacuation destinations and shelter information, available transportation modes, and traffic and road conditions at the origin, destination, and along the evacuation routes. In addition to general evacuation information, personalized information including tailored evacuation routes, service information, and estimated travel times is also provided based on traveler specified origin, destination, and route parameters. Updated information is provided throughout the evacuation and subsequent reentry as status changes and plans are adapted.	
LADOTD Social Media, LADOTD District Traffic Operations, Louisiana 511 Website, Media, TMC	Transportation Information Center	TIC Data Collection	'TIC Data Collection' collects transportation-related data from other centers, performs data quality checks on the collected data and then consolidates, verifies, and refines the data and makes it available in a consistent format to applications that support operational data sharing between centers and deliver traveler information to end-users. A broad range of data is collected including traffic and road conditions, transit data, emergency information and advisories, weather data, special event information, traveler services, parking, multimodal data, and toll/pricing data. It also shares data with other transportation information centers.	
LADOTD Social Media, LADOTD District Traffic Operations, Media, TMC	Data Distribution System	DDS Data Collection and Aggregation	'DDS Data Collection and Aggregation' collects data 'deposits' from producers including meta data such as the generation location and time. It authenticates and validates the data deposits and logs all associated meta data. Authenticated, valid data is bundled based on information type and location and made available as data products to consumers who are interested in the data. It establishes delivery parameters for data consumers that subscribe based on parameters including content type and geographic region of interest and delivers data to consumers based on these parameters.	
LADOTD Social Media, Louisiana 511 Website	Transportation Information Center	TIC Interactive Traveler Information	'TIC Interactive Traveler Information' disseminates personalized traveler information including traffic and road conditions, transit information, parking information, maintenance and construction information, multimodal information, event information, and weather information. Tailored information is provided based on the traveler's request in this interactive service.	



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LADOTD Social Media, Louisiana 511 Website	Transportation Information Center	TIC Traveler Telephone Information	'TIC Traveler Telephone Information' services voice-based traveler requests for information that supports traveler telephone information systems like 511. It takes requests for traveler information, which could be voice-formatted traveler requests, dual-tone multi-frequency (DTMF)-based requests, or a simple traveler information request, and returns the requested traveler information in the proper format. In addition to servicing requests for traveler information, it also collects and forwards alerts and advisories to traveler telephone information systems.	Existing
Local DPW	Maint and Constr Management Center	MCM Work Activity Coordination	'MCM Work Activity Coordination' disseminates work activity schedules and current asset restrictions to other agencies. Work schedules are coordinated with operating agencies, factoring in the needs and activities of other agencies and adjacent jurisdictions. Work schedules are also distributed to Transportation Information Centers for dissemination to the traveling public.	Existing
Local DPW	Maint and Constr Management Center	MCM Work Zone Management	'MCM Work Zone Management' remotely monitors and supports work zone activities, controlling traffic through dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers, and informing other groups of activity (e.g., traveler information, traffic management, other maintenance and construction centers) for better coordination management. Work zone speeds, and delays, and closures are provided to the motorist prior to the work zones. This application provides control of field equipment in all maintenance areas, including fixed and portable field equipment supporting both stationary and mobile work zones.	Existing
Local DPW	Traffic Management Center	TMC Work Zone Traffic Management	'TMC Work Zone Traffic Management' coordinates work plans with maintenance systems so that work zones are established that have minimum traffic impact. Traffic control strategies are implemented to further mitigate traffic impacts associated with work zones that are established, providing work zone information to driver information systems such as dynamic message signs.	Existing



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Appendix B ITS Functional Requirements

Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Local Emergency Services, Emergency 911 Centers, Emergency Services Functions, GOHSEP, HAZMAT Mobile Response, LADOTD District Traffic Operations, Local Public Safety Agencies, LSP	Emergency Management Center	Emergency Incident Command	'Emergency Incident Command' provides tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident. It supports communications with public safety, emergency management, transportation, and other allied response agency centers, tracks and maintains resource information, action plans, and the incident command organization itself. Information is shared with agency centers including resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response. It supports the functions and interfaces commonly supported by a mobile command center.	Existing
Local Emergency Services, GOHSEP, HAZMAT Mobile Response, LADOTD District Traffic Operations, Local Public Safety Agencies, TMC	Emergency Management Center	Emergency Commercial Vehicle Response	'Emergency Commercial Vehicle Response' identifies and initiates a response to commercial vehicle and freight equipment related emergencies. These emergencies may include incidents involving hazardous materials as well as the detection of non-permitted transport of security sensitive hazmat. It identifies the location of the vehicle, the nature of the incident, the route information, and information concerning the freight itself. The information supports the determination of the response and identifies the responding agencies to notify.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Local Emergency Services, GOHSEP, LADOTD District Traffic Operations, LADOTD ITS Section 56, Local Public Safety Agencies	Emergency Management Center	Emergency Evacuation Support	'Emergency Evacuation Support' coordinates evacuation plans among allied agencies and manages evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety. Where appropriate, the affected population is evacuated in shifts, using more than one evacuation route, and including several evacuation destinations to spread demand and thereby expedite the evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan. The public is provided with real-time evacuation guidance including basic information to assist potential evacuees in determining whether evacuation is necessary. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times. The evacuation and reentry status are monitored and used to refine the plan and resource allocations during the evacuation and subsequent reentry. It communicates with public health systems to develop evacuation plans and recommended strategies for disasters and evacuation scenarios involving biological or other medical hazards.	Existing
Local Planning Organizations	Archived Data System	Archive Government Reporting	'Archive Government Reporting' selects and formats data residing in an ITS archive to facilitate local, state, and federal government data reporting requirements. It provides transportation system statistics and performance measures in required formats to support investment and policy decisions.	Existing
Local Planning Organizations, TMC, Transportation Database	Archived Data System	Archive Data Repository	'Archive Data Repository' collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. It includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. It includes the capability to define a data registry that allows registration of data identifiers or data definitions for interoperable use throughout a region. It supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region. Repositories may be established to support operations planning, performance monitoring and management, and policy and investment decisions.	Planned



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Louisiana 511 Website, Media	Transportation Information Center	TIC Emergency Traveler Information	'TIC Emergency Traveler Information' provides emergency information to the public, including wide-area alerts and evacuation information. It provides emergency alerts, information on evacuation zones and evacuation requirements, evacuation destinations and shelter information, available transportation modes, and traffic and road conditions at the origin, destination, and along the evacuation routes. In addition to general evacuation information, personalized information including tailored evacuation routes, service information, and estimated travel times is also provided based on traveler specified origin, destination, and route parameters. Updated information is provided throughout the evacuation and subsequent reentry as status changes and plans are adapted.	Existing
LSP	Traffic Management Center	TMC Incident Detection	'TMC Incident Detection' identifies and reports incidents to Traffic Operations Personnel. It remotely monitors and controls traffic sensor and surveillance systems that support incident detection and verification. It analyzes and reduces the collected sensor and surveillance data, external alerting and advisory and incident reporting systems, anticipated demand information from intermodal freight depots, border crossings, special event information, and identifies and reports incidents and hazardous conditions	Existing, Planned
LSP, TMC	Traffic Management Center	TMC Regional Traffic Management	'TMC Regional Traffic Management' supports coordination between Traffic Management Centers in order to share traffic information between centers as well as control of traffic management field equipment. This coordination supports wide area optimization and regional coordination that spans jurisdictional boundaries; for example, coordinated signal control in a metropolitan area or coordination between freeway operations and arterial signal control within a corridor.	
LSP, TMC	Traffic Management Center	TMC Signal Control	'TMC Signal Control' provides the capability for traffic managers to monitor and manage the traffic flow at signalized intersections. This capability includes analyzing and reducing the collected data from traffic surveillance equipment and developing and implementing control plans for signalized intersections. Control plans may be developed and implemented that coordinate signals at many intersections under the domain of a single Traffic Management Center and are responsive to traffic conditions and adapt to support incidents, preemption and priority requests, pedestrian crossing calls, etc.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
LSP, TMC	Traffic Management Center	TMC Traffic Metering	'TMC Traffic Metering' provides center monitoring and control of traffic metering systems including on ramps, through interchanges, and on the mainline roadway. All types of metering are covered including pre-timed/fixed time, time-based, dynamic and adaptive metering strategies and special bypasses. Metering rates can be calculated based upon historical data or current conditions including traffic, air quality, etc.	
Media	Transportation Information Center	TIC Trip Planning	'TIC Trip Planning' provides pre-trip and en route trip planning services for travelers. It receives origin, destination, constraints, and preferences and returns trip plan(s) that meet the supplied criteria. Trip plans may be based on current traffic and road conditions, transit schedule information, and other real-time traveler information. Candidate trip plans are multimodal and may include vehicle, transit, and alternate mode segments (e.g., rail, ferry, bicycle routes, and walkways) based on traveler preferences. It also confirms the trip plan for the traveler and supports reservations and advanced payment for portions of the trip. The trip plan includes specific routing information and instructions for each segment of the trip and may also include information and reservations for additional services (e.g., parking) along the route.	
Personal Devices	Personal Information Device	Personal Traveler Information Reception	'Personal Traveler Information Reception' receives formatted traffic advisories, road conditions, traffic regulations, transit information, broadcast alerts, and other general traveler information broadcasts and presents the information to the traveler. The traveler information broadcasts are received by personal devices including personal computers and personal portable devices such as smart phones.	Existing, Planned
Personal Devices	Personal Information Device	Personal Trip Planning and Route Guidance	'Personal Trip Planning and Route Guidance' provides a personalized trip plan to the traveler. The trip plan is calculated based on preferences and constraints supplied by the traveler and provided to the traveler for confirmation. Coordination may continue during the trip so that the route plan can be modified to account for new information. Many equipment configurations are possible including systems that provide a basic trip plan to the traveler as well as more sophisticated systems that can provide transition by transition guidance to the traveler along a multi-modal route with transfers. Devices represented by this functional object include desktop computers at home, work, or at major trip generation sites, plus personal devices such as tablets and smart phones.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Personal Devices, Public	Personal Information Device	Personal Interactive Traveler Information	'Personal Interactive Traveler Information' provides traffic information, road conditions, transit information, yellow pages (traveler services) information, special event information, and other traveler information that is specifically tailored based on the traveler's request and/or previously submitted traveler profile information. It also supports interactive services that support enrollment, account management, and payments for transportation services. The interactive traveler information capability is provided by personal devices including personal computers and personal portable devices such as smart phones.	Existing, Planned
Ports	Freight Equipment	Freight Equipment Monitoring	'Freight Equipment Monitoring' includes the on-board devices used to monitor intermodal freight equipment. These devices provide freight equipment location and status of the freight, container, or chassis equipment.	Existing
Public	Personal Information Device	Personal Traveler Information Reception	'Personal Traveler Information Reception' receives formatted traffic advisories, road conditions, traffic regulations, transit information, broadcast alerts, and other general traveler information broadcasts and presents the information to the traveler. The traveler information broadcasts are received by personal devices including personal computers and personal portable devices such as smart phones.	Existing
Public Transit Services	Transit Management Center	Transit Center Fare Management	'Transit Center Fare Management' manages fare collection and passenger load management at the transit center. It provides the back office functions that support transit fare collection, supporting payment reconciliation with links to financial institutions and enforcement agencies for fare violations. It collects data required to determine accurate ridership levels, establish fares, and distribute fare information. It loads fare data into the vehicle prior to the beginning of normal operations and unloads fare collection data from the vehicle at the close out of normal operations. It manages allow/block lists and performs token validation.	Existing
Public Transit Services	Transit Management Center	Transit Center Fixed-Route Operations	'Transit Center Fixed-Route Operations' manages fixed route transit operations. It supports creation of schedules, blocks and runs for fixed and flexible route transit services. It allows fixed-route and flexible-route transit services to disseminate schedules and automatically updates customer service operator systems with the most current schedule information. It also supports automated dispatch of transit vehicles. Current vehicle schedule adherence and optimum scenarios for schedule adjustment are also provided. It also receives and processes transit vehicle loading data.	Existing



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Public Transit Services	Transit Management Center	Transit Center Information Services	'Transit Center Information Services' collects the latest available information for a transit service and makes it available to transit customers and to Transportation Information Centers for further distribution. Customers are provided information at transit stops and other public transportation areas before they embark and on-board the transit vehicle once they are en route. Information provided can include the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, yellow pages, and special events. In addition to general service information, tailored information (e.g., itineraries) are provided to individual transit users.	Existing
Public Transit Services	Transit Management Center	Transit Center Multi-Modal Coordination	'Transit Center Multi-Modal Coordination' supports transit service coordination between transit properties and coordinates with other surface and air transportation modes. As part of service coordination, it shares schedule and trip information, as well as transit transfer cluster (a collection of stop points, stations, or terminals where transfers can be made conveniently) and transfer point information between Multimodal Transportation Service Providers, Transit Agencies, and ISPs. An interface to Traffic Management also supports demand management strategies.	Existing
Public Transit Services	Transit Management Center	Transit Center Paratransit Operations	'Transit Center Paratransit Operations' manages demand responsive transit services, including paratransit services. It supports planning and scheduling of these services, allowing paratransit and other demand response transit services to plan efficient routes and better estimate arrival times. It also supports automated dispatch of paratransit vehicles and tracks passenger pick-ups and drop-offs. Customer service operator systems are updated with the most current schedule information.	Existing
Public Transit Services	Transit Management Center	Transit Center Passenger Counting	'Transit Center Passenger Counting' receives and processes transit vehicle loading data using two-way communications from equipped transit vehicles.	Existing
Public Transit Services	Transit Management Center	Transit Center Security	'Transit Center Security' monitors transit vehicle operator or traveler activated alarms received from on-board a transit vehicle. It supports transit vehicle operator authentication and provides the capability to remotely disable a transit vehicle. It also includes the capability to alert operators and police to potential incidents identified by these security features.	Existing



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Public Transit Services	Transit Management Center	Transit Center Vehicle Tracking	'Transit Center Vehicle Tracking' monitors transit vehicle location. The location information is collected via a data communication link between the transit vehicles and the transit center. The location information is presented to the transit operator on a digitized map of the transit service area. The location data may be used to determine real time schedule adherence and update the transit system's schedule in real-time. The real-time schedule information is disseminated to other information providers, which furnish the information to travelers.	Existing
Public Transit Services	Traveler Support Equipment	Transit Stop Information Services	'Transit Stop Information Services' furnishes transit users with real-time travel-related information at transit stops, multi-modal transfer points, and other public transportation areas. It provides transit users with information on transit routes, schedules, transfer options, available services, fares, and real-time schedule adherence. In addition to tailored information for individual transit users, it supports general annunciation and/or display of imminent arrival information and other information of general interest to transit users.	Existing
Public Transit Services	Traveler Support Equipment	Traveler Fare Management	'Traveler Fare Management' provides the capability for the traveler to access and use a common fare medium for transit fares, tolls, shared use, and/or parking lot charges using a public device at or near the point of service. It accepts a service request and means of payment or smart card, verifies eligibility, calculates the amount due, collects payment (or deducts balance if smart card), manages allow/block lists, performs token validation, and identifies payment problems. It may be implemented using a card reader/dispenser in a point of sale device that includes a communications interface to the financial infrastructure to support payment collection and reconciliation.	Existing



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
TMC	Emergency Management Center	Emergency Evacuation Support	'Emergency Evacuation Support' coordinates evacuation plans among allied agencies and manages evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety. Where appropriate, the affected population is evacuated in shifts, using more than one evacuation route, and including several evacuation destinations to spread demand and thereby expedite the evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan. The public is provided with real-time evacuation guidance including basic information to assist potential evacuees in determining whether evacuation is necessary. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times. The evacuation and reentry status are monitored and used to refine the plan and resource allocations during the evacuation and subsequent reentry. It communicates with public health systems to develop evacuation plans and recommended strategies for disasters and evacuation scenarios involving biological or other medical hazards.	
TMC	Emergency Management Center	Emergency Incident Command	'Emergency Incident Command' provides tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident. It supports communications with public safety, emergency management, transportation, and other allied response agency centers, tracks and maintains resource information, action plans, and the incident command organization itself. Information is shared with agency centers including resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response. It supports the functions and interfaces commonly supported by a mobile command center.	
TMC	Traffic Management Center	TMC Basic Surveillance	'TMC Basic Surveillance' remotely monitors and controls traffic sensor systems and surveillance (e.g., CCTV) equipment, and collects, processes and stores the collected traffic data. Current traffic information and other real-time transportation information is also collected from other centers. The collected information is provided to traffic operations personnel and made available to other centers.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
TMC	Traffic Management Center	TMC Environmental Monitoring	'TMC Environmental Monitoring' assimilates current and forecast road conditions and surface weather information using a combination of weather service provider information, information collected by other centers such as the Maintenance and Construction Management Center, data collected from environmental sensors deployed on and about the roadway, and information collected from connected vehicles. The collected environmental information is monitored and presented to the operator. This information can be used to issue general traveler advisories and support location specific warnings to drivers.	
TMC	Traffic Management Center	TMC Evacuation Support	'TMC Evacuation Support' supports development, coordination, and execution of special traffic management strategies during evacuation and subsequent reentry of a population in the vicinity of a disaster or major emergency. A traffic management strategy is developed based on anticipated demand, the capacity of the road network including access to and from the evacuation routes, and existing and forecast conditions. The strategy supports efficient evacuation and also protects and optimizes movement of response vehicles and other resources that are responding to the emergency.	
TMC	Traffic Management Center	TMC Incident Detection	'TMC Incident Detection' identifies and reports incidents to Traffic Operations Personnel. It remotely monitors and controls traffic sensor and surveillance systems that support incident detection and verification. It analyzes and reduces the collected sensor and surveillance data, external alerting and advisory and incident reporting systems, anticipated demand information from intermodal freight depots, border crossings, special event information, and identifies and reports incidents and hazardous conditions	
TMC	Traffic Management Center	TMC Incident Dispatch Coordination	'TMC Incident Dispatch Coordination' formulates and manages an incident response that takes into account the incident potential, incident impacts, and resources required for incident management. It provides information to support dispatch and routing of emergency response and service vehicles as well as coordination with other cooperating agencies. It provides access to traffic management resources that provide surveillance of the incident, traffic control in the surrounding area, and support for the incident response. It monitors the incident response and collects performance measures such as incident response and clearance times.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
TMC	Traffic Management Center	TMC Roadway Equipment Monitoring	'TMC Roadway Equipment Monitoring' monitors the operational status of field equipment and detects failures. It presents field equipment status to Traffic Operations Personnel and reports failures to the Maintenance and Construction Management Center. It tracks the repair or replacement of the failed equipment. The entire range of ITS field equipment may be monitored including sensors (traffic, infrastructure, environmental, security, speed, etc.) and devices (highway advisory radio, dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, beacons, security surveillance equipment, etc.).	
TMC	Traffic Management Center	TMC Traffic Information Dissemination	'TMC Traffic Information Dissemination' disseminates traffic and road conditions, closure and detour information, incident information, driver advisories, and other traffic-related data to other centers, the media, and driver information systems. It monitors and controls driver information system field equipment including dynamic message signs and highway advisory radio, managing dissemination of driver information through these systems.	
TMC	Traffic Management Center	TMC Traffic Management Decision Support	'TMC Traffic Management Decision Support' recommends courses of action to the traffic operator based on current and forecast road and traffic conditions. Traffic incidents, special events, maintenance activities and other events or conditions that impact capacity or demand are monitored. Historical data and models are used to compare the impact of potential courses of action and make recommendations to the operator. Decisions are supported through presentation of filtered and fused network-wide road and traffic conditions that identify network imbalances and recommended courses of action. The recommended actions may include predefined incident response plans, signal timing plan changes, DMS/HAR messages, truck restrictions, lane control strategies, metering strategies, and adjustment of variable speed limits. Multimodal strategies may also be recommended that include suggested transit strategies and suggested route and mode choices for travelers. Once a course of action is selected, traffic operations personnel implement these actions within the Traffic Management Center and coordinate the response with other centers in the region.	



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
TMC	Traffic Management Center	TMC Traffic Network Performance Evaluation	'TMC Traffic Network Performance Evaluation' measures traffic network performance and predicts travel demand patterns to support traffic flow optimization, demand management, and incident management. It collects traffic data from sensors and surveillance equipment as well as input from other Traffic Management Centers, emissions management, transit operations, and event promoters and uses this information to measure traffic network performance. It collects route planning information from transportation information centers and integrates and uses this information to predict future traffic conditions. The planned control strategies can be passed back to the transportation information center so that the intended strategies can be reflected in future route planning.	
TMC, Transportation Database	Archived Data System	Archive On-Line Analysis and Mining	'Archive On-Line Analysis and Mining' provides advanced data analysis, summarization, and mining features that facilitate discovery of information, patterns, and correlations in large data sets. Multidimensional analysis, selective summarization and expansion of data details, and many other advanced analysis services may be offered. Complex performance measures that are derived from multiple data sources may also be produced.	Planned
Toll Plaza	ITS Roadway Payment Equipment	Roadway Toll Collection Support	'Roadway Toll Collection Support' provides toll plazas the capability to identify properly equipped vehicles, collect electronic tolls, and provide a positive indication to the driver that a toll was collected. Violators are identified and images are collected. Toll transactions are stored and reported to the Payment Administration Center.	Planned
Tourism and Travel Service Information Sources	Transportation Information Center	TIC Travel Services Information and Reservation	'TIC Travel Services Information' disseminates information about traveler services such as lodging, restaurants, electric vehicle charging, and service stations. Tailored traveler service information is provided on request that meets the constraints and preferences specified by the traveler. This application also supports reservations and advanced payment for traveler services including parking and loading zone use.	Planned
Traffic Signal Systems	ITS Roadway Equipment	Roadway Field Management Station Operation	'Roadway Field Management Station Operation' supports direct communications between field management stations and the local field equipment under their control.	Existing



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Element Name	Physical Object Name	Functional Object	Functional Object Description	Status
Traffic Signal Systems	ITS Roadway Equipment	Roadway Signal Control	'Roadway Signal Control' includes the field elements that monitor and control signalized intersections. It includes the traffic signal controllers, detectors, conflict monitors, signal heads, and other ancillary equipment that supports traffic signal control. It also includes field masters, and equipment that supports communications with a central monitoring and/or control system, as applicable. The communications link supports upload and download of signal timings and other parameters and reporting of current intersection status. It represents the field equipment used in all levels of traffic signal control from basic actuated systems that operate on fixed timing plans through adaptive systems. It also supports all signalized intersection configurations, including those that accommodate pedestrians. In advanced, future implementations, environmental data may be monitored and used to support dilemma zone processing and other aspects of signal control that are sensitive to local environmental conditions.	Existing, Planned
Transportation Database	Archived Data System	Archive Situation Data Archival	'Archive Situation Data Archival' collects and archives traffic, roadway, and environmental information for use in off-line planning, research, and analysis. It controls and collects information directly from equipment at the roadside, reflecting the deployment of traffic detectors that are used primarily for traffic monitoring and planning purposes, rather than for traffic management. It also collects situation data from connected vehicles. The data collected, quality checks performed, and aggregation strategies are defined to support transportation system performance monitoring and management.	Planned
Workzone ITS	ITS Roadway Equipment	Roadway Traffic Information Dissemination	'Roadway Traffic Information Dissemination' includes field elements that provide information to drivers, including dynamic message signs and highway advisory radios.	
Workzone ITS	ITS Roadway Equipment	Roadway Work Zone Safety	'Roadway Work Zone Safety' includes field elements that detect vehicle intrusions in work zones and warns crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone.	Planned



APPENDIX C ITS USER NEEDS

The User Needs listed below are designed to answer two basic questions:

- What does the System(s) need to do?
- What do users need from the System(s)?

They are written from the perspective of a system user or stakeholder in that system and are categorized by the Intelligent Transportation System (ITS) Service Packages that comprise the Louisiana Statewide ITS Architecture. Service Packages provide an accessible, service-oriented perspective to the overall system architecture used to describe the region or project. They identify the pieces of the physical view that are required to implement a particular ITS service. Each of these service packages has a set of User Needs associated with it that can be used as the basis for stakeholder validation, setting proper expectations, and eliciting requirements for the systems and devices to be implemented.

CVO01: Carrier Operations and Fleet Management (Management)

This service package manages a fleet of commercial vehicles. The Fleet and Freight Management Center monitors the vehicle fleet and can provide routes using either an in-house capability or an external provider. Routes generated by either approach are constrained by hazardous materials and other restrictions (such as height or weight). A route is electronically sent to the Commercial Vehicle with any appropriate dispatch instructions. The location of the Commercial Vehicle can be monitored by the Fleet and Freight Management Center and routing changes can be made depending on current road network conditions. This service package also supports maintenance of fleet vehicles with on-board monitoring equipment. Records of vehicle mileage, preventative maintenance and repairs are maintained.

Appendix Table C-1: Carrier Operations and Fleet Management Needs

Number	Need	Comment
1	Fleet and Freight Management needs to know the location and status of its vehicles, drivers, and loads in order to efficiently manage and maintain its fleet.	
2	Fleet and Freight Management needs access to accurate and current information about traffic road conditions in order to make informed decisions regarding its fleet.	
3	Fleet and Freight Management needs to provide accurate and appropriate routes for its drivers and vehicles that include such factors as size and weight restrictions, times of day, and type of load, e.g. Hazmat loads.	
4	Fleet and Freight Management needs to monitor and record the mileage, repairs, and safety violations of its vehicles in order to efficiently manage its fleet.	
5	Fleet and Freight Management needs to make its fleet vehicle repair status available to the appropriate commercial vehicle administration agencies in order to update their credentials.	

CVO03: Electronic Clearance (Safety)

This service package provides for automated clearance at roadside check facilities. The roadside check facility communicates with the Commercial Vehicle Administration Center to retrieve infrastructure



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Appendix C ITS User Needs

snapshots of critical carrier, vehicle, and driver data to be used to sort passing vehicles. This allows a good driver/vehicle/carrier to pass roadside facilities at highway speeds using vehicle to infrastructure (V2I) Communications. Results of roadside clearance activities will be passed on to the Commercial Vehicle Administration Center. The roadside check facility may be equipped with Automated Vehicle Identification (AVI), weighing sensors, communications equipment, and computer workstations. Communications may be implemented using a range of technologies from transponder data readers through connected vehicle short range communications.

Appendix Table C-2: CVO03: Electronic Clearance Needs

Number	Need	Comment
1	Commercial Vehicle Administration needs to be able to determine the weight and other characteristics of commercial vehicles operating on its roadways as part of the clearance process.	
2	Commercial Vehicle Administration needs to collect and maintain electronic records of commercial vehicles and drivers operating on its roadways in order to support efficient clearance operations.	
3	Commercial Vehicle Administration needs to be able to coordinate electronic credentials and safety records with other commercial vehicle administration agencies concerning commercial vehicles and drivers operating on its roadways in order to support efficient clearance operations.	
4	Commercial Vehicle Administration needs to be able to perform electronic clearance of commercial vehicle credentials and safety records of a commercial vehicle and its driver in order to maintain the smooth flow of goods through its roadways.	
5	Commercial Vehicle Administration needs to be able to inform the appropriate parties of issues dealing with the clearance of a commercial vehicle or its driver in order to maintain the smooth flow of goods through its roadways.	

CVO04: CV Administrative Processes (Safety)

This service package supports program administration and enrollment and provides for electronic application, processing, fee collection, issuance, and distribution of CVO credential and tax filing. Through this process, carriers, drivers, and vehicles may be enrolled in a variety of programs including electronic clearance and wireless inspection programs which allow commercial vehicles to be screened at mainline speeds. Through this enrollment process, current profile databases are maintained in the Commercial Vehicle Administration Center and snapshots of this data are made available to the roadside check facilities. Current program status is maintained and made available to carriers, drivers, and other authorized users of the data. Enrolled carriers are provided the option to review and challenge the collected data.

Commercial Vehicle Administration Centers can share current program status and credential information with other Centers, so that it is possible for any Commercial Vehicle Administration Center to have access to all credentials, credential fees, credentials status and safety status information. In addition, it is possible for one Commercial Vehicle Administration Center to collect HAZMAT route restrictions information from other Commercial Vehicle Administration Centers and then act as a clearinghouse for this route restrictions information.



Appendix Table C-3: CVO04: CV Administrative Processes Needs

Number	Need	Comment
1	Commercial Vehicle Administration needs to be able to issue credentials to commercial vehicle carriers or Fleet and Freight Management in order to reduce an agency's and a carrier's paperwork burden.	
2	Commercial Vehicle Administration needs to exchange safety and credentials, fuel, and mileage tax information with other commercial vehicle administrations to support electronic credentialing.	
3	Commercial Vehicle Administration needs to be able to exchange hazardous materials (HAZMAT) route restrictions with other jurisdictions and Fleet and Freight Management in order to maintain safe use of the roadways.	
4	Fleet and Freight Management need to be able verify the contents and accuracy of the records maintained by Commercial Vehicle Administration concerning its operations.	

CVO12: HAZMAT Management (Safety)

This service package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material transport, including response to incidents. HAZMAT tracking is performed by the Fleet and Freight Management Center. The Emergency Management Center is notified by the Commercial Vehicle and the Fleet and Freight Management Center of the HAZMAT vehicle location and information about the HAZMAT load. If an incident occurs, the Emergency Management Center can use the information to coordinate the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Center. The latter information can be provided prior to the beginning of the trip, during the trip, or gathered following the incident depending on the selected policy and implementation.

Appendix Table C-4: CVO12: HAZMAT Management Needs

Number	Need	Comment
1	Fleet and Freight Management needs to monitor the status of its freight, including the drivers, vehicles, and the cargo in order to determine if an issue involving hazardous materials occurs and where it is.	
2	Fleet and Freight Management needs to provide the status, location, and specific contents of loads that have hazardous materials (HAZMAT) or dangerous goods to the appropriate emergency management when they are involved in an incident in order to ensure the safety of the public and the responders.	
3	Emergency Management needs to collect information from Fleet and Freight Management or directly from equipped vehicles in order determine the status, location, and specific contents of loads with hazardous materials (HAZMAT) when they are involved in an incident in order to protect the public's safety and ensure the safety of its responders.	

CVO15: Fleet and Freight Security (Safety)

This service package provides enhanced security for commercial vehicle fleets and freight. Internal and external alerts and advisories are monitored to identify potential threats to the safety and security of the fleet and freight. It provides for the planning and tracking of three aspects of commercial vehicle shipments.



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For each shipment, the commercial vehicle, the freight equipment, and the commercial vehicle driver are monitored for consistency with the planned assignment. Any unauthorized changes are determined by the Fleet and Freight Management Center and then the appropriate people and Centers are notified. As the freight is shipped and tracked, security and public safety agencies may also interrogate the freight container to determine if it has been breached and to identify container contents. Once a route has been assigned, changes must be coordinated. Commercial Vehicle Drivers are alerted to any changes in route from the planned route and given an opportunity to justify a rerouting. Any unauthorized or unexpected route changes by the Commercial Vehicle will register a route deviation alert with the Fleet and Freight Management Center, which can notify local public safety agencies of the route deviation when appropriate (e.g., if there is safety sensitive HAZMAT being carried). Freight managers may decide to take further action on the alerts and/or provide responses that explain that the alerts are false alarms. If no explanation is received, the Fleet and Freight Management Center may notify the Emergency Management Center.

Appendix Table C-5: CVO15: Fleet and Freight Security Needs

Number	Need	Comment
1	Fleet and Freight Management needs to be able to track the location and monitor the status of its freight being carried in order to provide efficient movement of goods for its clients.	
2	Fleet and Freight Management needs to determine the status of the contents of a container in order to provide safe and efficient movement of goods.	
3	Fleet and Freight Management needs to be able to alert the appropriate emergency management center if a breach or problem is detected with the container or its contents.	
4	Fleet and Freight Management needs to be able to provide the contents and status of a container to security and public safety agencies.	
5	Fleet and Freight Management needs to be able to provide the status of a freight shipment to customers, terminals, and other distribution and logistics systems.	

DM01: ITS Data Warehouse (Informational)

This service package provides access to transportation data to support transportation planning, condition and performance monitoring, safety analysis, and research. Configurations range from focused repositories that house data collected and owned by a single agency, district, private sector provider, or research institution to broad repositories that contain multimodal, multidimensional data from varied data sources covering a broader region. Both central repositories and physical distributed ITS data repositories are supported. Requests for data that are satisfied by access to a single repository in the ITS Data Warehouse service package may be parsed by the local repository and dynamically translated to requests to other repositories that relay the data necessary to satisfy the request. The repositories could include a data registry capability that allows registration of data identifiers or data definitions for interoperable use throughout a region.

Appendix Table C-6: DM01: ITS Data Warehouse Needs

Number	Need	Comment
1	System operators need to be able to store data for long term access by themselves and other operators.	



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Number	Need	Comment
2	System operators need to be able to query for and receive archive data products containing freeway data, tolling data, arterial data, parking data, transit and ridesharing data, incident management data, safety-related data, CVO data, environmental and weather data, vehicle and passenger data and intermodal operations data.	
3	System operators need to be able to manage data processing with regard to data archive functions, including data aggregation, data tagging (processed, edited, raw, transformed, etc.), data storage timing and longevity, data quality analysis, data formatting and metadata assignments.	

MC05: Roadway Maintenance and Construction (Management)

This service package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way. Maintenance services include landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, CCTV, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling maintenance and construction activities.

Appendix Table C-7: MC05: Roadway Maintenance and Construction Needs

Number	Need	Comment
1	Maintenance and construction operations need to be able to schedule maintenance and construction on a roadway system or right-of-way.	
2	Maintenance and construction operations need to be able to collect environmental conditions information from various weather sources in order to aid in scheduling maintenance and construction activities.	
3	Maintenance and construction operations need to coordinate maintenance and construction activities with traffic and other management agencies.	
4	Maintenance and construction operations need to be able to monitor the status of ITS field equipment and coordinate with Traffic Operations on the maintenance of the equipment.	

MC06: Work Zone Management (Safety)

This service package manages work zones, controlling traffic in areas of the roadway where maintenance, construction, and utility work activities are underway. Traffic conditions are monitored using CCTV cameras and controlled using dynamic message signs (DMS), Highway Advisory Radio (HAR), gates and barriers. Work zone information is coordinated with other groups (e.g., TIC, traffic management, other maintenance and construction centers). Work zone speeds and delays are provided to the motorist prior to the work zones. This service package provides control of field equipment in all maintenance and construction areas, including fixed, portable, and truck-mounted devices supporting both stationary and mobile work zones.

Appendix Table C-8: MC06: Work Zone Management Needs

Number	Need	Comment
1	Maintenance and construction operations need to be able to manage work zones and control traffic in areas of the roadway where maintenance, construction, and utility work activities are underway.	
2	Maintenance and construction operations need to be able to inform the driver of upcoming work zones, including reduced speeds, lanes affected, and delays.	



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Number	Need	Comment
3	Maintenance and construction operations need to be able to coordinate work zone information with other agencies (e.g., traveler information, traffic operations, and other maintenance and construction centers).	
4	Maintenance and construction operations need to be able to provide control of field equipment in all maintenance and construction areas, including fixed, portable, and truck-mounted devices supporting both stationary and mobile work zones.	

MC07: Work Zone Safety Monitoring (Safety)

This service package provides warnings to maintenance personnel within a work zone about potential hazards within the work zone. It enables vehicles or the infrastructure to provide warnings to workers in a work zone when a vehicle is moving in a manner that appears to create an unsafe condition (e.g., moving at high speed or entering the work zone).

Appendix Table C-9: MC07: Work Zone Safety Monitoring Needs

Number	Need	Comment
1	Maintenance and Construction workers need to receive warnings about hazards in the work zone to maintenance personnel, such as a vehicle moving in a manner that appears to create an unsafe condition.	
2	Maintenance and Construction operations need to be able to monitor for hazards in the work zone.	
3	Maintenance and Construction operations need to be able to monitor operational status of work zone safety devices.	
4	Maintenance and construction operations need to be able to provide advisory information to vehicles that represent a safety risk to workers in a work zone area.	

MC08: Maintenance and Construction Activity Coordination (Management)

This service package supports the dissemination of maintenance and construction activity to centers that can utilize it as part of their operations, or to Transportation Information Centers who can provide the information to travelers. Center to center coordination of work plans supports adjustments to reduce disruption to regional transportation operations.

Appendix Table C-10: MC08: Maintenance and Construction Activity Coordination Needs

Number	Need	Comment
1	Maintenance and construction operations need to be able to disseminate maintenance and construction activity to transportation agencies that can utilize it as part of their operations.	

MC09: Infrastructure Monitoring (Informational)

This service package monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts) using both fixed and vehicle-based infrastructure monitoring sensors. Fixed sensors monitor vibration, stress, temperature, continuity, and other parameters and mobile sensors and data logging devices collect information on current infrastructure condition. This service package also monitors vehicle probes for vertical acceleration data and other probe data that may be used to determine current pavement condition.



Appendix Table C-11: MC09: Infrastructure Monitoring Needs

Number	Need	Comment
1	Maintenance and construction operations need to be able to monitor the condition of transportation-related infrastructure using both fixed and vehicle-based infrastructure monitoring sensors.	

PS01: Emergency Call-Taking and Dispatch (Safety)

This service package provides basic public safety call-taking and dispatch services. It includes emergency vehicle equipment, equipment used to receive and route emergency calls, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. Coordination between Emergency Management Centers supports emergency notification between agencies. Wide area wireless communications between the Emergency Management Center and an Emergency Vehicle supports dispatch and provision of information to responding personnel. This service package also provides information to support dynamic routing of emergency vehicles. Traffic information, road conditions, and weather advisories are provided to enhance emergency vehicle routing. The Emergency Management Center provides routing information based on real-time conditions and has the option to request an ingress/egress route from the Traffic Management Center.

Appendix Table C-12: Emergency Call-Taking and Dispatch Needs

Number	Need	Comment
1	Emergency Management needs to provide basic public safety call-taking and dispatch of emergency vehicles in order to provide safe and rapid deployment of appropriate resources to an emergency.	
2	Emergency Management needs to coordinate with other emergency management operations in order to support emergency notification between agencies.	
3	Emergency Management needs to process current and historical weather and road conditions data from multiple sources in order to generate warnings and route advisories for individual emergency responders or emergency response dispatchers.	
4	Emergency Management needs to provide emergency responders with road weather warnings and advisories.	
5	Emergency Management needs to provide routing information to the emergency responders.	

PS02: Emergency Response (Environmental)

This service package supports emergency/ incident response by personnel in the field. It includes emergency vehicle equipment used to provide response status as well as video or images from either the vehicle or from emergency personnel in the field. Wide area wireless communications between the Emergency Management Center, Emergency Personnel and Emergency Vehicles supports a sharing of emergency response information. The service package also includes tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders at or near the incident scene to support local management of an incident, including the functions and interfaces commonly supported by a mobile command center.

Appendix Table C-13: Emergency Response Needs

Number	Need	Comment
1	Emergency Management needs to be able to obtain information from the incident scene to support incident response.	



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Number	Need	Comment
2	Emergency Management needs to provide response in the field to incidents and emergency situations.	
3	Emergency Management needs to coordinate with other emergency management operations in order to support emergency response	

PS03: Emergency Vehicle Preemption (Safety)

This service package provides signal preemption for public safety first responder vehicles. Both traditional signal preemption systems and new systems based on connected vehicle technology are covered. In more advanced systems, movement of public safety vehicles through the intersection can be facilitated by clearing queues and holding conflicting phases. In addition, this SP also covers the transition back to normal traffic signal operations after providing emergency vehicle preemption.

Appendix Table C-14: PS03: Emergency Vehicle Preemption Needs

Number	Need	Comment
1	Emergency Management needs to be able to request signal preemption from Traffic Operations for a specific emergency vehicle.	
2	Emergency Management needs to be able request signal preemption locally for one or more signals the vehicle is approaching so that it may quickly and safely cross the intersections.	
3	Traffic Management needs to be able to adjust signal timing to provide signal preemption for an emergency vehicle based upon a request from Emergency Management.	
4	Traffic Management needs to be able to support local adjustments to signal timing based upon a local preemption request and transition back to normal traffic signal operations after providing emergency vehicle preemption.	
5	Traffic Operations needs to be able to provide signal timing information to emergency vehicles to support emergency vehicle preemption.	

PS08: Roadway Service Patrols (Safety)

This service package supports roadway service patrol vehicles that monitor roads and aid motorists, offering rapid response to minor incidents (flat tire, accidents, out of gas) to minimize disruption to the traffic stream. If problems are detected, the roadway service patrol vehicles will provide assistance to the motorist (e.g., push a vehicle to the shoulder or median). The service package monitors service patrol vehicle locations and supports vehicle dispatch to identified incident locations. Incident information collected by the service patrol is shared with traffic, maintenance and construction, and traveler information systems.

Appendix Table C-15: PS08: Roadway Service Patrols Needs

Number	Need	Comment
1	Roadway Service Patrol Operations need to be able to monitor service patrol vehicle locations and dispatch service patrol vehicles to identified incident locations.	
2	Roadway Service Patrol Operations need to be able to monitor roads and aid motorists, offering rapid response to minor incidents (flat tire, accidents, out of gas) in order to minimize disruption to the traffic stream.	
3	Roadway Service Patrol Operations need to be able to share incident information collected by the service patrol with traffic, maintenance and construction, and traveler information systems.	

PS09: Transportation Infrastructure Protection (Safety)



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This service package includes the monitoring of transportation infrastructure (e.g., bridges, tunnels and management centers) for potential threats using sensors and surveillance equipment and barrier and safeguard systems to control access, preclude an incident, and mitigate the impact of an incident if it occurs. Threats can result from acts of nature (e.g., hurricanes, earthquakes), terrorist attacks or other incidents causing damage to the infrastructure (e.g., stray barge hitting a bridge support). Infrastructure may be monitored with acoustic, environmental threat (such as nuclear, biological, chemical, and explosives), infrastructure condition and integrity, motion and object sensors and video and audio surveillance equipment.

Data from such sensors and surveillance equipment may be processed in the field or sent to a center for processing. The data enables operators at the center to detect and verify threats. When a threat is detected, agencies are notified. Detected threats or advisories received from other agencies result in an increased level of system preparedness. In response to threats, barrier and safeguard systems may be activated to deter an incident, control access to an area or mitigate the impact of an incident. Barrier systems include gates, barriers and other automated and remotely controlled systems that manage entry to transportation infrastructure. Safeguard systems include blast shields, exhaust systems and other automated and remotely controlled systems that mitigate impact of an incident.

Appendix Table C-16: PS09: Transportation Infrastructure Protection Needs

Number	Need	Comment
1	Traffic Operations and Emergency Management need to be able to monitor transportation infrastructure (e.g., bridges, tunnels and management centers) for potential threats in order to control access, preclude an incident, and mitigate the impact of an incident if it occurs.	
2	Traffic Operations and Emergency Management need to be able to notify agencies if a threat is detected.	
3	Traffic Operations and Emergency Management need to be able to collect advisories from other agencies related to detected threats.	
4	Traffic Operations in response to threats needs to be able to activate the barrier and/or safeguard systems in order to deter an incident, control access to an area or mitigate the impact of an incident.	

PS10: Wide-Area Alert (Safety)

This service package uses ITS driver and traveler information systems to alert the public in emergency situations such as child abductions, severe weather events, civil emergencies, and other situations that pose a threat to life and property. The alert includes information and instructions for transportation system operators and the traveling public, improving public safety and enlisting the public's help in some scenarios. The ITS technologies will supplement and support other emergency and homeland security alert systems such as the Emergency Alert System (EAS).

When an emergency situation is reported and verified and the terms and conditions for system activation are satisfied, a designated agency broadcasts emergency information to traffic agencies, transit agencies, information service providers, toll operators, and others that operate ITS systems. The ITS systems, in turn, provide the alert information to transportation system operators and the traveling public using ITS technologies such as dynamic message signs, highway advisory radios, in-vehicle displays, transit displays, 511 traveler information systems, and traveler information websites.



Appendix Table C-17: PS10: Wide-Area Alert Needs

Number	Need	Comment
1	Emergency Management needs to be able to verify the reported emergency situation in order to activate the alert system.	
2	Emergency Management needs to be able to alert the public in emergency situations such as child abductions, severe weather events, civil emergencies, and other situations that pose a threat to life and property, using ITS technologies such as dynamic message signs, highway advisory radios, in-vehicle displays, transit displays, 511 traveler information systems, and traveler information web sites.	
3	Emergency Management needs to be able to broadcast emergency information to traffic agencies, transit agencies, information service providers, toll operators, and others that operate ITS systems.	

PS11: Early Warning System (Safety)

This service package monitors and detects potential, looming, and actual disasters including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents, nuclear power plant accidents, and acts of terrorism including nuclear, chemical, biological, and radiological weapons attacks). The service package monitors alerting and advisory systems, ITS sensors and surveillance systems, field reports, and emergency call-taking systems to identify emergencies and notifies all responding agencies of detected emergencies.

Appendix Table C-18: PS11: Early Warning System Needs

Number	Need	Comment
1	Emergency Management needs to be able to collect potential threats, alerts, and advisories from various ITS systems to identify emergencies.	
2	Emergency Management needs to be able to alert all relevant agencies of detected emergencies.	

PS12: Disaster Response and Recovery (Safety)

This service package enhances the ability of the surface transportation system to respond to and recover from disasters. It addresses the most severe incidents that require an extraordinary response from outside the local community. All types of disasters are addressed including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents, nuclear power plant accidents, and national security emergencies such as nuclear, chemical, biological, and radiological weapons attacks).

The service package supports coordination of emergency response plans, including general plans developed before a disaster as well as specific tactical plans with short time horizon that are developed as part of a disaster response. The service package provides enhanced access to the scene for response personnel and resources, provides better information about the transportation system in the vicinity of the disaster, and maintains situation awareness regarding the disaster itself. In addition, this service package tracks and coordinates the transportation resources - the transportation professionals, equipment, and materials - that constitute a portion of the disaster response.

The service package identifies the key points of integration between transportation systems and the public safety, emergency management, public health, and other allied organizations that form the overall disaster response. In this service package, the Emergency Management Center represents the federal, regional,



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state, and local Emergency Operations Centers and the Incident Commands that are established to respond to the disaster. The interface between the Emergency Management Center and the other centers provides situation awareness and resource coordination among transportation and other allied response agencies. In its role, traffic management implements special traffic control strategies and detours and restrictions to effectively manage traffic in and around the disaster. Maintenance and construction provides damage assessment of road network facilities and manages service restoration. Transit management provides a similar assessment of status for transit facilities and modifies transit operations to meet the special demands of the disaster. As immediate public safety concerns are addressed and disaster response transitions into recovery, this service package supports transition back to normal transportation system operation, recovering resources, managing on-going transportation facility repair, supporting data collection and revised plan coordination, and other recovery activities.

This service package builds on the basic traffic incident response service that is provided by TM08, the Traffic Incident Management service package. This service package addresses the additional complexities and coordination requirements that are associated with the most severe incidents that warrant an extraordinary response from outside the local jurisdictions and require special measures such as the activation of one or more emergency operations centers. Many users of ARC-IT will want to consider both TM08 and this service package since every region is concerned with both day-to-day management of traffic-related incidents and occasional management of disasters that require extraordinary response.

Disaster Response and Recovery is also supported by PS14, the "Disaster Traveler Information" service package that keeps the public informed during a disaster response. See that service package for more information.

Appendix Table C-19: PS12: Disaster Response and Recovery Needs

Number	Need	Comment
1	Emergency Management needs to support integration between transportation systems and the public safety, emergency management, public health, and other allied organizations that form the overall disaster response.	
2	Emergency Management needs to support coordination of emergency response plans issued by various agencies in order plan for regional response to disasters.	
3	Emergency Management needs to be able to track and coordinate the transportation professionals, equipment, and materials that constitute the disaster response in order to respond to and recover from disasters.	
4	Emergency Management needs to be able to provide to other regional centers information about the transportation system in the vicinity of the disaster.	

PS13: Evacuation and Reentry Management (Safety)

This service package supports evacuation of the general public from a disaster area and manages subsequent reentry to the disaster area. The service package addresses evacuations for all types of disasters, including disasters like hurricanes that are anticipated and occur slowly, allowing a well-planned orderly evacuation, as well as disasters like terrorist acts that occur rapidly, without warning, and allow little or no time for preparation or public warning.

This service package supports coordination of evacuation plans among the federal, state, and local transportation, emergency, and law enforcement agencies that may be involved in a large-scale evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and



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along the evacuation route are informed of the plan. Information is shared with traffic management agencies to implement special traffic control strategies and to control evacuation traffic, including traffic on local streets and arterials as well as the major evacuation routes. Reversible lanes, shoulder use, closures, special signal control strategies, and other special strategies may be implemented to maximize capacity along the evacuation routes. Transit resources play an important role in an evacuation, removing many people from an evacuated area while making efficient use of limited capacity. Additional shared transit resources may be added and managed in evacuation scenarios. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times.

Evacuations are also supported by PS14, the "Disaster Traveler Information" service package, which keeps the public informed during evacuations. See that service package for more information.

Appendix Table C-20: Evacuation and Reentry Management Needs

Number	Need	Comment
1	Emergency Management needs to support evacuation of the general public from disaster area.	
2	Emergency Management needs to coordinate evacuation plans among the federal, state, and local transportation, emergency, and law enforcement agencies that may be involved in a large-scale evacuation.	
3	Emergency Management needs to share evacuation information with traffic management agencies in order to implement special traffic control strategies to control evacuation traffic.	
4	Emergency Management needs to share evacuation information with transit agencies in order to remove people from an evacuated area while making efficient use of limited capacity.	
5	Emergency Management needs to manage subsequent reentry of the general public to the disaster area.	

PS14: Disaster Traveler Information (Safety)

This service package uses ITS to provide disaster-related traveler information to the general public, including evacuation and reentry information and other information concerning the operation of the transportation system during a disaster. This service package collects information from multiple sources including traffic, transit, public safety, emergency management, shelter provider, and travel service provider organizations. The collected information is processed and the public is provided with real-time disaster and evacuation information using ITS traveler information systems.

A disaster will stress the surface transportation system since it may damage transportation facilities at the same time that it places unique demands on these facilities to support public evacuation and provide access for emergency responders. Similarly, a disaster may interrupt or degrade the operation of many traveler information systems at the same time that safety-critical information must be provided to the traveling public. This service package keeps the public informed in these scenarios, using all available means to provide information about the disaster area including damage to the transportation system, detours and closures in effect, special traffic restrictions and allowances, special transit schedules, and real-time information on traffic conditions and transit system performance in and around the disaster.

This service package also provides emergency information to assist the public with evacuations when necessary. Information on mandatory and voluntary evacuation zones, evacuation times, and instructions are provided. Available evacuation routes and destinations and current and anticipated travel conditions



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along those routes are provided so evacuees are prepared and know their destination and preferred evacuation route. Information on available transit services and traveler services (shelters, medical services, hotels, restaurants, gas stations, etc.) is also provided. In addition to general evacuation information, this service package provides specific evacuation trip planning information that is tailored for the evacuee based on origin, selected destination, and evacuee-specified evacuation requirements and route parameters.

This service package augments the Traveler Information (TI) service packages that provide traveler information on a day-to-day basis for the surface transportation system. This service package provides focus on the special requirements for traveler information dissemination in disaster situations.

Appendix Table C-21: PS14: Disaster Traveler Information Needs

Number	Need	Comment
1	Emergency Management and Traveler Information need to be able to provide general public real-time disaster and evacuation information using ITS traveler information systems.	
2	Traveler Information needs to be able to collect disaster related information from multiple sources including traffic, transit, public safety, emergency management, shelter provider, and travel service provider organizations.	
3	Emergency Management and Traveler Information need to be able to provide evacuees with information including a shelter that matches their needs, including location, availability, and routing.	
4	Emergency Management and Traveler Information need to be able to provide information concerning roadside resources including information provided by other evacuees to help understand availability of resources.	
5	Emergency Management and Traveler Information need to be able to provide evacuees with information regarding when they can return to their area, including routes and road conditions.	

PT01: Transit Vehicle Tracking (Mobility)

This service package monitors current transit vehicle location using an Automated Vehicle Location (AVL) System. The location data may be used to determine real time schedule adherence and update the transit system’s schedule in real-time.

Appendix Table C-22: PT01: Transit Vehicle Tracking Needs

Number	Need	Comment
1	Transit Operations needs to be able to monitor the location of transit vehicles in order to improve decision making by transit operators and provide more accurate information to travelers .	
2	Transit Operations needs to be able to determine whether each transit vehicle is adhering to its schedule.	
3	Transit Operations needs to be able to send transit vehicle location and schedule adherence data to other centers in order to support traveler information and traffic operations.	

PT02: Transit Fixed-Route Operations (Mobility)

This service package performs automated dispatch and system monitoring for fixed-route and flexible-route transit services. This service performs scheduling activities including the creation of schedules, blocks and runs, as well as operator assignment. This service monitors the transit vehicle trip performance against the schedule and provides information displays at the Transit Management Center.



Appendix Table C-23: PT02: Transit Fixed-Route Operations Needs

Number	Need	Comment
1	Transit Operations needs to be able to create and update schedules for fixed route or flexible route transit routes in order to plan transit operations.	
2	Transit Operations needs to be able to disseminate transit schedules for fixed route or flexible route transit routes to traveler information centers.	
3	Transit Operations needs to be able to dispatch transit vehicles for fixed route or flexible route runs.	
4	Transit Operations need to be able to schedule blocks (vehicle assignments) and runs (operator assignments) for fixed route or flexible route transit operations.	
5	Transit Operations need to be able to monitor transit vehicle schedule adherence in order to manage fixed route or flexible route transit operations.	
6	Transit Operations need to have real time information about the road network in order to increase the effectiveness of operations for fixed route or flexible route transit.	

PT03: Dynamic Transit Operations (Mobility)

The Dynamic Transit Operations service package allows travelers to request trips and obtain itineraries using a personal device such as a smart phone, tablet, or personal computer. The trips and itineraries cover multiple transportation services (public transportation modes, private transportation services, shared-ride, walking and biking). This service package builds on existing technology systems such as computer-aided dispatch/ automated vehicle location (CAD/AVL) systems and automated scheduling software, providing a coordination function within and between transit providers that would dynamically schedule and dispatch or modify the route of an in-service vehicle by matching compatible trips together. TI06 covers other shared use transportation options.

Appendix Table C-24: PT03: Dynamic Transit Operations Needs

Number	Need	Comment
1	Transit Operations needs to be able to take reservations for demand response trips that include the travelers' origin, destination, and departure time in order to do demand response scheduling.	
2	Transit Operations needs to be able to schedule demand response transit vehicles based upon travelers trip requests.	
3	Transit Operations needs to provide and update manifests to properly manage demand response transit vehicles based upon traveler requests.	
4	Transit Operations needs to be able to monitor the real-time location of demand response transit vehicles.	
5	Transit Operations need to have real time information about the road network in order to increase the effectiveness of operations for demand response transit.	

PT04: Transit Fare Collection Management (Mobility)

This service package manages transit fare collection on-board transit vehicles and at transit stops using electronic means. It allows transit users to use a traveler card or other electronic payment device such as a smart phone. Readers located either in the infrastructure or on-board the transit vehicles enable electronic fare payment. Data is processed, stored, and displayed on the transit vehicle and communicated as needed to the Transit Management Center. This service supports ad-hoc payments to the transport provider (typically through the 'payment' and 'fare' flows), payments using a transport provider's account system using account-based tokens or integrated multi-provider account systems (typically through the 'account', 'secureID' and 'authorization' flows).



Appendix Table C-25: PT04: Transit Fare Collection Management Needs

Number	Need	Comment
1	Transit Operations needs to be able to collect transit fares on-board transit vehicles using electronic payment methods in order to improve transit operation.	
2	Transit Operations needs to be able to collect transit fares at transit stations using electronic payment methods in order to support bus rapid transit or train systems.	
3	Transit Operations needs to be able to download transit fare collection information from transit vehicles or transit fare gates at stations in order to manage the fare collection operations.	
4	Travelers need to be able to add value to payment instruments in order to use them as part of fare collection systems.	
5	Transit Operations needs to be able to support transit fare reconciliation with other transit agencies participating in a regional fare collection system.	
6	Transit operations needs to be able to share fare information with traveler information systems and other transit operations.	

PT05: Transit Security (Mobility)

This service package provides for the physical security of transit passengers and transit vehicle operators. On-board equipment performs surveillance and sensor monitoring in order to identify potentially hazardous situations. The surveillance equipment includes video (e.g., CCTV cameras), audio systems and/or event recorder systems. The sensor equipment includes threat sensors (e.g., chemical agent, toxic industrial chemical, biological, explosives, and radiological sensors) and object detection sensors (e.g., metal detectors). Transit user or transit vehicle operator activated alarms are provided on-board. Public areas (e.g., transit stops, park and ride lots, stations) are also monitored with similar surveillance and sensor equipment and provided with transit user activated alarms. In addition this service package provides surveillance and sensor monitoring of non-public areas of transit facilities (e.g., transit yards) and transit infrastructure such as bridges, tunnels, and transit railways or bus rapid transit (BRT) guideways. The surveillance equipment includes video and/or audio systems. The sensor equipment includes threat sensors and object detection sensors as described above as well as, intrusion or motion detection sensors and infrastructure integrity monitoring (e.g., rail track continuity checking or bridge structural integrity monitoring).

Most of the surveillance and sensor data that is collected by this service package may be monitored by either the Emergency Management Center or the Transit Management Center, providing two possible approaches to implementing this service package. This service package also supports remote transit vehicle disabling and transit vehicle operator authentication by the Transit Management Center.

Appendix Table C-26: PT05: Transit Security Needs

Number	Need	Comment
1	Transit Operations needs to be able to monitor conditions on a transit vehicle in order to provide a secure environment for travelers.	
2	Transit Operations needs to be able to monitor transit stops and transit stations in order to provide a secure environment for travelers.	
3	Transit Operations needs to be able to monitor transit secure areas such as bus or rail yards and transit infrastructure such as tracks and tunnels in order to provide security for transit assets.	
4	Transit Operations needs to be able to authenticate operators of transit vehicles and perform remote disabling of vehicles if necessary in order to ensure secure operation of the vehicles.	



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Number	Need	Comment
5	Transit Operations needs to be able to alert emergency services to incidents on vehicles, at stations/stops, or other monitored assets.	
6	Transit Operations needs to be able to inform traveler information systems or the media regarding transit related incidents in order to keep the traveling public informed of the impacts these incidents may have on their trips.	

PT06: Transit Fleet Management (Mobility)

This service package supports automatic transit maintenance scheduling and monitoring. On-board condition sensors monitor system status and transmit critical status information to the Transit Management Center. The Transit Management Center processes this data and schedules preventative and corrective maintenance. The service package also supports the day to day management of the transit fleet inventory, including the assignment of specific transit vehicles to blocks and the assignment of transit vehicle operators to runs.

Appendix Table C-27: Transit Fleet Management Needs

Number	Need	Comment
1	Transit Operations needs to be able to remotely monitor transit vehicle operating conditions in order to determine if maintenance of the vehicle is needed.	
2	Transit Operations needs to be able to perform maintenance scheduling of transit vehicles including real time requests for actions by the vehicle operator.	
3	Transit Operations needs to be able to assign specific vehicles to blocks in order to perform vehicle allocation.	
4	Transit Operations needs to be able to assign transit operators to runs.	

PT07: Transit Passenger Counting (Mobility)

This service package counts the number of passengers entering and exiting a transit vehicle using sensors mounted on the vehicle and communicates the collected passenger data back to the management center. The collected data can be used to calculate reliable ridership figures and measure passenger load information at designated stops.

Appendix Table C-28: PT07: Transit Passenger Counting Needs

Number	Need	Comment
1	Transit Operations needs to be able to count the passengers entering or exiting a transit vehicle in order to support efficient operations.	

PT08: Transit Traveler Information (Mobility)

This service package provides transit users at transit stops and on-board transit vehicles with ready access to transit information. The information services include transit stop annunciation, imminent arrival signs, and real-time transit schedule displays that are of general interest to transit users. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this service package.



Appendix Table C-29: Transit Traveler Information Needs

Number	Need	Comment
1	Transit Operations needs to be able to provide static and real time transit information to traveler information systems and the media in order to increase travelers' ability to plan and manage their trips.	
2	Transit Operations needs to be able to provide static and real time transit information directly to travelers either pre-trip or en route in order to support traveler trip decisions.	
3	Transit Operations needs to be able to share static and real time transit information with other transit operations in order to facilitate multisystem trip planning.	

PT09: Transit Signal Priority (Mobility)

The Transit Signal Priority service package uses transit vehicle to infrastructure communications to allow a transit vehicle to request priority at one or a series of intersections. The service package provides feedback to the transit driver indicating whether the signal priority has been granted or not. This service package can contribute to improved operating performance of the transit vehicles by reducing the time spent stopped at a red light.

Appendix Table C-30: PT09: Transit Signal Priority Needs

Number	Need	Comment
1	Transit Operations needs to provide approaching Transit Vehicle location and heading to the roadside signal controller so that the controller can modify signal timing in favor of the transit vehicle.	
2	Transit Operations needs to provide approaching Transit Vehicle location and heading to traffic operations so that they can adjust the signal controller signal timing in favor of the transit vehicle.	
3	Transit Operations needs to provide transit vehicle data to Traffic Operations including loading information and schedule performance in order to support decision making regarding whether to give the transit vehicle priority at the intersection.	
4	The Transit Vehicle Operator needs to progress through his arterial route safely and efficiently.	

PT14: Multi-modal Coordination (Mobility)

This service package establishes two way communications between multiple transit and traffic agencies to improve service coordination. Multimodal coordination between transit agencies can increase traveler convenience at transit transfer points and clusters (a collection of stops, stations, or terminals where transfers can be made conveniently) and also improve operating efficiency.

Appendix Table C-31: PT14: Multi-modal Coordination Needs

Number	Need	Comment
1	Transit Operations needs to be able to coordinate service information with other Transit Operations in order to improve operations.	
2	Transit Operations needs to be able to coordinate with other transportation modes (e.g. ferry operations, airports) in order to improve service connections with these other modes.	
3	Transit Operations needs to coordinate with other centers (e.g. traffic, parking, and event promoters) in order to share system information.	

PT17: Transit Connection Protection (Mobility)



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This service package allows travelers to initiate a request for connection protection anytime during the trip using a personal device or on-board equipment and receive a confirmation indicating whether the request is accepted. Connection protection uses real time data to examine the arrival status of a transit vehicle and to transmit a hold message to a vehicle or other mode of transportation (e.g. rail) in order for the traveler to make a successful transfer from one vehicle to another. Connection protection can be performed within a single agency, across multiple agencies, and across multiple modes. In an intermodal, multimodal or interagency environment, a transfer request brokerage system, represented by the Transit Management System, can be used to determine the feasibility of a connection protection request and support schedule coordination between agencies.

Appendix Table C-32: PT17: Transit Connection Protection Needs

Number	Need	Comment
1	Transit Operations needs to be able to determine when connections between transit routes are in jeopardy due to late arrival of one transfer vehicle in order to develop corrective actions to prevent missed connections.	
2	Transit Operations needs to be able to adjust the real time schedule of a transit vehicle in order to protect the connections made from other transit vehicles to the subject vehicle at a station or stop.	
3	Transit Travelers need to be able to provide a trip plan to Transit Operations and request they be provided with connection protection for the trip.	
4	Transit Operations needs to be able to track a specific traveler’s trip through the system and provide connection protection actions to give the traveler the best chance of making their trip connections.	
5	Transit Operations needs to be able to adjust the real time schedule of a transit vehicle in order to provide connection protection for a traveler’s trip.	
6	Transit Operations needs to be able to provide a traveler with updates regarding their transit trip, including connection protection actions taken by Transit Operations.	

ST01: Emissions Monitoring (Environmental)

This service package monitors individual vehicle emissions and provides general air quality monitoring using distributed sensors to collect the data. The collected information is transmitted to the Emissions Management Center for processing. Both area wide air quality monitoring and point emissions monitoring are supported by this service package. For area wide monitoring, this service package measures air quality, identifies sectors that are non-compliant with air quality standards, and collects, stores and reports supporting statistical data. For point emissions monitoring, this service package collects data from on-board diagnostic systems and measures tail pipe emissions to identify vehicles that exceed emissions standards and/or clean vehicles that could be released from standard emissions tests, depending on policy and regulations. Summary emissions information or warnings can also be displayed to drivers. The gathered information can be used to implement environmentally sensitive travel demand management (TDM) programs, policies, and regulations.

Appendix Table C-33: ST01: Emissions Monitoring Needs

Number	Need	Comment
1	Emissions Management needs to be able to measure wide area pollution data in order to monitor wide area pollution levels.	



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Number	Need	Comment
2	Emissions Management needs to be able to measure vehicle emissions data collected from individual vehicles at the roadside in order to identify high emitting vehicles.	
3	Emission Management needs to be able to provide summary emission information or warning to drivers.	
4	Emissions Management needs to be able to provide wide area pollution information to the media, traveler information centers, and other transportation centers in order to support traveler information and transportation operations.	
5	Emissions Management needs to be able to send information about vehicles with excessive emissions to the appropriate Department of Motor Vehicles (DMV) or law enforcement.	

SU03: Data Distribution (Support)

This service package manages the distribution of data from data providers to data consumers and protects those data from unauthorized access. It informs data providers of how to provide data, manages data subscriptions, and provides data forwarding capabilities. The service package also maintains a directory of System Users that want data and supports multiple distribution mechanisms including publish-subscribe and directly from data provider to data consumer. It allows data consumers to specify (and change the specification of) data they wish to receive.

Appendix Table C-34: Data Distribution Needs

Number	Need	Comment
1	System Operators, Vehicle Operators, and PID Operators need to be able to request and receive information without establishing formal relationships with data providers.	
2	System Operators need to be able to provide data to a geographically selected area.	
3	Data Distribution Operators need to be able to exchange data with other data distribution systems.	
4	Data Distribution Operators need to be able to establish and maintain data processing algorithms, rules and related metadata, including all those processes related to Validation, Integration, Sanitization, and Aggregation.	

TI01: Broadcast Traveler Information (Mobility)

This service package provides a digital broadcast service that disseminates traveler information to all equipped travelers within range. It collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, roadway maintenance and construction information, air quality and weather information, and broadcasts the information to travelers using technologies such as FM subcarrier, satellite radio, cellular data broadcasts, and Internet streaming technologies.

This service package also provides location-specific or situation-relevant information to travelers in vehicles using Dedicated Short Range Communications (DSRC) infrastructure supporting mobility service packages for connected vehicles. DSRC is used to deliver real-time traveler information including travel times, incident information, road conditions, and emergency traveler information to vehicles as they pass connected vehicle roadside equipment along their route. This service package provides public information that is available to all equipped vehicles in the vicinity of the roadside equipment.



Appendix Table C-35: TI01: Broadcast Traveler Information Needs

Number	Need	Comment
1	Traveler Information needs to be able to collect timely, accurate, and reliable traffic, transit, and other road conditions data from multiple sources in order to broadcast the latest conditions affecting travelers.	
2	Traveler Information needs to be able to inform as much of the traveling public as possible using any available broadcast media to increase mobility and safety through better information.	
3	Travelers need access to timely, accurate, and reliable traffic, transit, and other travel conditions in order to make informed decisions about their travel.	

TI02: Personalized Traveler Information (Mobility)

This service package provides tailored information in response to a traveler request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported. The traveler can obtain current information regarding traffic conditions, roadway maintenance and construction, transit services, ride share/ride match, parking management, detours and pricing information. Although the Internet is the predominate network used for traveler information dissemination, a range of two-way wide-area wireless and fixed-point to fixed-point communications systems may be used to support the required data communications with the traveler. A variety of interactive devices may be used by the traveler to access information prior to a trip or en-route including phone via a 511-like portal and web pages via smart phone, tablet, personal computer, and a variety of in-vehicle devices.

Appendix Table C-36: TI02: Personalized Traveler Information Needs

Number	Need	Comment
1	Traveler Information needs to be able to collect timely, accurate, and reliable traffic, transit, and other road conditions data from multiple sources in order to inform individual travelers of the latest conditions affecting their travel.	
2	Traveler Information needs to be able to inform as much of the traveling public as possible using any available interactive media to increase mobility and safety through better information.	
3	Travelers, including drivers or passengers, need access to timely, accurate, and reliable traffic, transit, and other travel conditions in order to make informed decisions about their travel.	
4	Travelers, including drivers or passengers, need to be able to request specific and customized information concerning current and future travel conditions in order to make decisions about their own travel.	

TM01: Infrastructure-Based Traffic Surveillance (Informational)

This service package includes traffic detectors, other surveillance equipment, the supporting field equipment, and Center to Field communications to transmit the collected data back to the Traffic Management Center. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Center). The data generated by this service package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long-range planning. The collected data can also be analyzed and made available to users and the Traveler Information Center physical object.



Appendix Table C-37: TM01: Infrastructure-Based Traffic Surveillance

Number	Need	Comment
1	Traffic Operations need to be able to monitor the road network using infrastructure devices in order to detect and verify incidents and support implementation of traffic operational strategies.	
2	Traffic Operations need to be able to monitor the infrastructure devices used for road network monitoring in order to detect faults in equipment or communications.	
3	Traffic Operations need to be able to send network monitoring data to other centers in order to support traveler information.	

TM06: Traffic Information Dissemination (Informational)

This service package provides driver information using roadway equipment such as dynamic message signs or highway advisory radio. A wide range of information can be disseminated including traffic and road conditions, closure and detour information, travel restrictions, incident information, and emergency alerts and driver advisories. This package provides information to drivers at specific equipped locations on the road network. Careful placement of the roadway equipment provides the information at points in the network where the drivers have recourse and can tailor their routes to account for the new information. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), Transit Management, Emergency Management, and Transportation Information Centers. A link to the Maintenance and Construction Management Center allows real time information on road/bridge closures and restrictions due to maintenance and construction activities to be disseminated.

Appendix Table C-38: TM06: Traffic Information Dissemination Needs

Number	Need	Comment
1	Traffic Operations need to be able to provide traffic and incident information to drivers using roadside devices such as dynamic message signs and highway advisory radio.	
2	Traffic Operations need to be able to monitor roadside devices used to provide traffic and traveler information to drivers.	
3	Traffic Operations need to be able to provide traffic and incident information, including images to the media.	
4	Traffic Operations need to be able to provide traffic and incident information, including images to traveler information, transit, maintenance and emergency centers.	

TM07: Regional Traffic Management (Management)

This service package provides for the sharing of information and control among traffic management centers to support regional traffic management strategies. Regional traffic management strategies that are supported include inter-jurisdictional, real-time coordinated traffic signal control systems and coordination between freeway operations and traffic signal control within a corridor. This service package advances the TM03-Traffic Signal Control and TM05-Traffic Metering service packages by adding the communications links and integrated control strategies that enable integrated, interjurisdictional traffic management. The nature of optimization and extent of information and control sharing is determined through working



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arrangements between jurisdictions. This package relies principally on roadside instrumentation supported by the Traffic Signal Control and Traffic Metering service packages and adds hardware, software, and fixed-point communications capabilities to implement traffic management strategies that are coordinated between allied traffic management centers. Several levels of coordination are supported from sharing of information through sharing of device control between TMCs.

Appendix Table C-39: TM07: Regional Traffic Management Needs

Number	Need	Comment
1	Traffic Operations need to exchange traffic and incident data with other Traffic Management Centers in order to support regional coordination spanning jurisdictional boundaries.	
2	Traffic Operations need to exchange traffic control data with other traffic management centers to support inter-jurisdictional, real-time coordinated traffic signal control systems and coordination between freeway operations and traffic signal control within a corridor.	

TM08: Traffic Incident Management System (Mobility)

This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The service package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as rail operations and event promoters. Information from these diverse sources is collected and correlated by this service package to detect and verify incidents and implement an appropriate response. This service package supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications or resource coordination between centers. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination service package and dissemination of incident information to travelers through the Broadcast Traveler Information or Interactive Traveler Information service packages. The roadside equipment used to detect and verify incidents also allows the operator to monitor incident status as the response unfolds. The coordination with emergency management might be through a CAD system or through other communication with emergency personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel. This service package is closely related with the Public Safety service packages, which focus on services that support first responders. In particular, local management of the incident using an incident command system is covered by PS02.

Appendix Table C-40: TM08: Traffic Incident Management System Needs

Number	Need	Comment
1	Traffic Operations need to detect and verify incidents on roadways using CCTV and field sensors.	
2	Traffic Operations need to share incident information with other ITS centers in order to coordinate incident response.	
3	Traffic Operations need to obtain incident information from other ITS centers in order to coordinate incident response	
4	Emergency Operations need to be able to dispatch emergency assets to a traffic incident.	



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Number	Need	Comment
5	Traffic Operations need to coordinate requests for resources with emergency and maintenance centers in order to support cleanup after the incident.	

TM09: Integrated Decision Support and Demand Management (Management)

This service package recommends courses of action to transportation operators in a corridor, downtown area, or other heavily traveled area. Recommendations are based on an assessment of current and forecast transportation network performance and environmental conditions. Multi-modal transportation operational strategies are created that consider all modes and all roads in the travel area to correct network imbalances and effectively manage available capacity. As part of the operational strategies, this service package may also recommend lane restrictions, transit, parking, and toll strategies to influence traveler route and mode choices to support active demand management programs and policies managing both traffic and the environment. Operational strategies, including demand management recommendations, are coordinated to support operational decisions by each transportation operator that are consistent with the recommended strategy. All recommended operational strategies are based on historical evaluation, real-time assessment, and forecast of the roadway network performance based on predicted travel demand patterns. This service package also collects air quality, parking availability, transit usage, and vehicle occupancy data to support operational strategies that manage and balance capacity and demand.

Appendix Table C-41: TM09: Integrated Decision Support and Demand Management Needs

Number	Need	Comment
1	Traffic Operations need to be able to use current and forecast road and traffic conditions to develop traffic management plans.	
2	Traffic Operations need to be able to develop operational decisions based upon analysis of current and forecast road and traffic conditions.	
3	Traffic Operations need to be able to collect information describing multi-source, real-time data (both infrastructure and vehicle based) on arterials, freeways, and transit systems to develop operational decisions that can be applied to corridors or to the region as a whole.	
4	Traffic Operations needs to be able to collect information from transit, parking, and toll operations in order to support development of demand management strategies.	
5	Traffic Operations needs to be able to implement demand management strategies in order to correct network imbalances and effectively manage available capacity.	
6	Traffic Operations needs to be able to collect emissions data to support development of demand management strategies.	

TM10: Electronic Toll Collection (Mobility)

The Electronic Toll Collection service package provides toll operators with the ability to collect tolls electronically and detect and process violations. The fees that are collected may be adjusted to implement demand management strategies. Field-Vehicle Communication between the roadway equipment and the vehicle is required as well as Fixed Point-Fixed Point interfaces between the toll collection equipment and transportation authorities and the financial infrastructure that supports fee collection. Toll violations are identified and electronically posted to vehicle owners. Standards, inter-agency coordination, and financial clearinghouse capabilities enable broad interoperability for these services.



Appendix Table C-42: TM10: Electronic Toll Collection Needs

Number	Need	Comment
1	Electronic Toll System Operators need to allow users to set up and maintain a user account.	
2	Electronic Toll Collection needs to allow toll payment without the vehicle stopping at a toll plaza.	
3	Electronic Toll System Operators need to be able to detect, process, and notify users of toll violations in order to prevent loss of revenue due to toll violations.	
4	Electronic Toll System Operators need to be able to support interagency coordination and financial clearinghouse operations so that multiple toll agencies are able to operate with the same type of user devices.	
5	The toll operations need to be able to set the road pricing based on the time of the day, traffic condition and vehicle characteristics (vehicle size, weight, axle count, etc.) and stored toll prices.	

TM16: Reversible Lane Management (Management)

This service package provides for the management of reversible lane facilities. In addition to standard surveillance capabilities, this service package includes sensory functions that detect wrong-way vehicles and other special surveillance capabilities that mitigate safety hazards associated with reversible lanes. The package includes the field equipment, physical lane access controls, and associated control electronics that manage and control these special lanes. This service package also includes the equipment used to electronically reconfigure intersections and manage right-of-way to address dynamic demand changes and special events.

Appendix Table C-43: TM16: Reversible Lane Management Needs

Number	Need	Comment
1	Traffic Operations need to be able to manage reversible lane facilities in order to allow lanes to be signed for operation in different directions at different times of the day.	
2	Traffic Operations need to be able to ensure safe operation of reversible lanes through wrong-way vehicle detection and other special surveillance capabilities in order to mitigate safety hazards associated with reversible lanes.	
3	Traffic Operations need to be able to control the field equipment, physical lane access controls, and associated control electronics that manage and control these special lanes.	
4	Traffic Operations need to be able to provide current reversible lane status information to drivers.	

WX01: Weather Data Collection (Environmental)

This service package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway. It also collects data from vehicles in the road network that can be used to directly measure or infer current environmental conditions. It leverages vehicle on-board systems that measure temperature, sense current weather conditions (rain and sun sensors) and also can monitor aspects of the vehicle operational status (e.g., use of headlights, wipers, and traction control system) to gather information about local environmental conditions. In addition, environmental sensor systems located on Maintenance and Construction Vehicles are also potential data sources. The collected environmental data is used by the Weather Information Processing and Distribution service package to process the information and make decisions on operations. The collected environmental data may be aggregated, combined with data attributes and sent to meteorological systems for data qualification and further data consolidation. The service package may also request and receive qualified data sets from meteorological systems.



Appendix Table C-44: WX01: Weather Data Collection Needs

Number	Need	Comment
1	Traffic operations or maintenance and construction operations need be able to collect road conditions and weather data from environmental sensors on or in the vicinity of the roadway.	
2	Traffic operations need to be able to collect road conditions and weather data from vehicle on-board sensors.	
3	Traffic operations and maintenance and construction operations need to share collected environmental data with each other.	
4	Traffic operations and Maintenance and construction need to be able to receive environmental data from Weather operations.	
5	Maintenance and construction operations need to be able to collect road conditions and weather data from maintenance vehicle on-board sensors.	
6	Weather Systems need be able to collect road conditions and weather data from environmental sensors on or in the vicinity of the roadway.	

WX02: Weather Information Processing and Distribution (Environmental)

This service package processes and distributes the environmental information collected from the Weather Data Collection service package. This service package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so operational centers and decision support systems can make decision on corrective actions to take. The continuing updates of road condition information and current temperatures can be used to deploy road maintenance resources, issue general traveler advisories, issue location specific warnings more effectively to drivers using the Traffic Information Dissemination service package, and aid operators in scheduling work activity.

Appendix Table C-45: WX02: Weather Information Processing and Distribution Needs

Number	Need	Comment
1	Maintenance and construction operations need to be able to process collected environmental information to issue location specific road weather warnings derived from roadway environmental sensor data, vehicle on-board sensor data and weather service operations to make decisions regarding efficient deployment of road maintenance resources based on historical, current and forecasted environmental conditions.	
2	Maintenance and construction operations needs to process collected environmental information to issue road weather alerts, warnings and advisories derived from roadway environmental sensor data, vehicle on-board sensor data and weather service operations to share the road weather information with emergency management operations, transit management operations, rail operations, weather service operations and other maintenance and construction operations.	



APPENDIX D INTERFACES

Appendix Table D-1: Information Flows

Flow Name	Flow Description
actuate secure payment	Initiation of a payment action, ideally based on an encrypted token or biometric marker. Such a payment action could be a simple validation that the secure token allows the user access to the travel resource, or it could be the initiation of a payment transaction.
air quality information	Aggregated region-wide measured air quality data and possible pollution incident information.
alert notification	Notification of a major emergency such as a natural or man-made disaster, civil emergency, or child abduction for distribution to the public. The flow identifies the alert originator, the nature of the emergency, the geographic area affected by the emergency, the effective time period, and information and instructions necessary for the public to respond to the alert. This flow may also identify specific information that should not be released to the public.
alert notification coordination	Coordination of emergency alerts to be distributed to the public. This includes notification of a major emergency such as a natural or man-made disaster, civil emergency, or child abduction for distribution to the public and status of the public notification.
alert status	Information indicating the current status of the emergency alert including identification of the traveler and driver information systems that are being used to provide the alert.
alternate mode information	Schedule information for alternate mode transportation providers such as air, ferry, and passenger-carrying heavy rail. This also includes details of incidents and other service disruptions that have occurred in the alternative mode. This also includes measures of service demand that supports assessment of their impact on the road network.
archive analysis requests	A user request that initiates data mining, analytical processing, aggregation or summarization, report formulation, or other advanced processing and analysis of archived data. The request also includes information that is used to identify and authenticate the user and support electronic payment requirements, if any.
archive analysis results	Processed information products, supporting meta data, and any associated transaction information resulting from data mining, analytical processing, aggregation or summarization, report formulation, or other on-line processing and analysis of archived data.
archive request confirmation	Confirmation that an archive request has been received and processed with information on the disposition of the request.
archive status	Notification that data provided to an archive contains erroneous, missing, or suspicious data or verification that the data provided appears valid. If an error has been detected, the offending data and the nature of the potential problem are identified.
archived data product requests	A user-specified request for archived data products (i.e., data, meta data, or data catalogs). The request also includes information that is used to identify and authenticate the user and support electronic payment requirements, if any.
archived data products	Raw or processed data, meta data, data catalogs and other data products provided to a user system upon request. The response may also include any associated transaction information.
asset archive data	Information describing transportation assets including pavements, bridges, and all other infrastructure included in the transportation network. In addition, information can cover support assets (support equipment and systems, software, etc.). Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
asset restrictions	Restrictions levied on transportation asset usage based on infrastructure design, surveys, tests, or analyses. This includes standard height, width, and weight restrictions by facility as well as special restrictions such as spring weight restrictions and temporary bridge weight restrictions.
asset status update	Changes to status of pavement, bridges, signs and other assets resulting from maintenance or construction activities or infrastructure monitoring. The updates may include changes in installation information, materials information, vendor/contractor information, condition, and current maintenance status. In addition to infrastructure asset updates, the information provided may also include status of the maintenance and construction support assets, including vehicle and equipment utilization and repair records.



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Appendix D Interfaces

Flow Name	Flow Description
automated vehicle control parameters	Information, instructions, and control parameters for automated vehicle operations including current system conditions and advisories, control parameters (e.g., speed, required vehicle performance profiles, gaps or headways) and check in/checkout instructions.
automated vehicle control status	Data provided by a connected vehicle identifying it's current mode and operational status and information provided to support check-in/checkout of the lane and coordinated maneuvers while on the automated facility.
barrier system control	Information used to configure and control barrier systems that are represented by gates, barriers and other automated or remotely controlled systems used to manage entry to roadways.
booking status	Status of the freight transport booking that includes the identities of the Commercial Vehicle and driver who will pick-up the freight or a request for more information from the originator. This includes proposed transport booking changes including departure/arrival changes, conveyance changes.
broadcast traveler information	General traveler information that contains traffic and road conditions, link travel times, incidents, advisories, restrictions, vehicle requirements, work zones, transit service information, weather information, parking information, and other related traveler information.
carrier participation report	Report that summarizes motor carrier participation in CVO programs. Used to identify the level of active participation and to report which enrolled carriers are not participating as expected.
commercial vehicle identities	Identification information for the Commercial Vehicle (e.g., license plate number or USDOT number), Freight Equipment (e.g., container, chassis, or trailer identification), Carrier, and Driver.
commercial vehicle location data	Current vehicle location and related operational conditions data provided by a commercial vehicle.
commercial vehicle permit	Commercial vehicle permits including those for oversize, overweight, or hazmat shipments.
cooperative adaptive cruise control parameters	Information, instructions, and control parameters for CACC operations including current system conditions and advisories, control parameters (e.g., target speeds, required vehicle profiles, recommended gaps, lane information) and cluster instructions that support CACC vehicle string creation and dissolution.
cooperative adaptive cruise control status	Data provided by a connected vehicle identifying it's current mode and operational status and information provided to support CACC string creation and dissolution.
credentials information	Response containing full vehicle fuel tax and registration credentials information. "Response" may be provided in reaction to a real-time query or a standing request for updated information. The query flow is not explicitly shown.
credentials status information	Credentials information such as registration, licensing, insurance, check flags, and electronic screening enrollment data. A unique identifier is included. Corresponds to the credentials portion of CVISN "snapshots." The status information may be provided as a response to a real-time query or as a result of a standing request for updated information (subscription). This may also include information about non-U.S. fleets for use by U.S. authorities, and information regarding U.S. fleets made available to Mexican and Canadian authorities. The query flow is not explicitly shown.
current infrastructure restrictions	Restrictions levied on transportation asset usage based on infrastructure design, surveys, tests, or analyses. This includes standard facility design height, width, and weight restrictions, special restrictions such as spring weight restrictions, and temporary facility restrictions that are imposed during maintenance and construction.
cv driver record	Information typically maintained by a state driver licensing agency about a driver of a commercial vehicle including driver identification data, license data, permit data, and driving history details. The query flow is not explicitly shown.
data collection and monitoring control	Information used to configure and control data collection and monitoring systems.
data subscription	Data subscription includes those dialogs necessary to determine what data is available for subscription/query, and also the dialogs necessary to create or modify data subscriptions/queries.
decision support information	Information provided to support effective and safe incident response, including local traffic, road, and weather conditions, hazardous material information, and the current status of resources (including vehicles, other equipment, supplies) that have been allocated to an incident.
device configuration coordination	A handshake between two different devices in the same vehicle or conveyance so the devices don't interfere with each or send conflicting information. This coordination may result in a personal information device (PID) carried by a traveler not transmitting its current location while on board vehicle, a transit vehicle, or a micromobility vehicle transmitting its vehicle profile and current location. For example, in the carry-in scenario, the personal device might go into a 'quiet' mode when carried into the vehicle that is already equipped with an integrated system that can broadcast safety messages.



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Appendix D Interfaces

Flow Name	Flow Description
device control request	Request for device control action
device data	Data from detectors, environmental sensor stations, roadside equipment, and traffic control devices, including device inventory information.
device identification	An identifier and device type designation that is used to uniquely identify a device in the Connected Vehicle Environment.
device status	Status information from devices
electric charging services inventory	Information provided for electric charging stations identifying the location, operating hours, current availability, charging capacity and standards supported, access restrictions, and rates/fee structure.
emergency archive data	Logged emergency information including information that characterizes identified incidents (routine highway incidents through disasters), corresponding incident response information, evacuation information, surveillance data, threat data, and resource information. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
emergency dispatch requests	Emergency vehicle dispatch instructions including incident location and available information concerning the incident.
emergency dispatch response	Request for additional emergency dispatch information and provision of en route status.
emergency notification	An emergency request for assistance that is automatically initiated by a vehicle or manually initiated by a vehicle occupant or a traveler (vulnerable road user) with a personal information device. The request includes call-back number, date, time, location, pre-event vehicle heading, vehicle make, model, model year, and fuel type, and crash severity indicators. Crash severity indicators include: airbags deployed, number of impacts, crash delta velocity, principle direction of force, and rollover indication. In addition, seatbelt restraint use, number of occupants, occupant location, and intrusion may be included. For commercial vehicles, this flow may also include freight equipment type (box, flatbed, trailer, container, etc.), type of cargo (refrigerated, non-perishable, liquid, etc.), hazardous material data, quantity of cargo, and cargo permits as applicable (hazmat, special routing permissions).
emergency plan coordination	Information that supports coordination of emergency management plans, continuity of operations plans, emergency response and recovery plans, evacuation plans, and other emergency plans between agencies. This includes general plans that are coordinated prior to an incident and shorter duration tactical plans that are prepared during an incident.
emergency traffic control information	Status of a special traffic control strategy or system activation implemented in response to an emergency traffic control request, a request for emergency access routes, a request for evacuation, a request to activate closure systems, a request to employ driver information systems to support public safety objectives, or other special requests. Identifies the selected traffic control strategy and system control status.
emergency traffic control request	Special request to preempt the current traffic control strategy in effect at one or more signalized intersections or highway segments, activate traffic control and closure systems such as gates and barriers, activate safeguard systems, or use driver information systems. For example, this flow can request all signals to red-flash, request a progression of traffic control preemptions along an emergency vehicle route, request a specific evacuation traffic control plan, request activation of a road closure barrier system, or place a public safety or emergency-related message on a dynamic message sign.
emergency traffic coordination	Coordination supporting disaster response including evacuation and reentry. Includes coordination of special traffic control strategies that support efficient evacuation and reentry while protecting and optimizing movement of response vehicles and other resources responding to the emergency.
emergency transit schedule information	Information on transit schedule and service changes that adapt the service to better meet needs of responders and the general public in an emergency situation, including special service schedules supporting evacuation.
emergency transit service request	Request to modify transit service and fare schedules to address emergencies, including requests for transit services to evacuate people from and/or deploy response agency personnel to an emergency scene. The request may poll for resource availability or request pre-staging, staging, or immediate dispatch of transit resources.
emergency transit service response	Response indicating changes to transit service, fares, and/or restrictions that will be made and status of transit resources to be deployed to support emergency response and/or evacuation.
emergency traveler information	Public notification of an emergency such as a natural or man-made disaster, civil emergency, or child abduction. This flow also includes evacuation information including evacuation instructions, evacuation zones, recommended evacuation times, tailored evacuation routes and destinations, traffic and road conditions along the evacuation routes, traveler services and shelter information, and reentry times and instructions.



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Appendix D Interfaces

Flow Name	Flow Description
emergency traveler information request	Request for alerts, evacuation information, and other emergency information provided to the traveling public.
emergency vehicle tracking data	The current location and operating status of the emergency vehicle.
emissions archive data	Air quality and vehicle emissions information that is collected by sensors or derived from models. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
environmental conditions data	Current road conditions (e.g., surface temperature, subsurface temperature, moisture, icing, treatment status) and surface weather conditions (e.g., air temperature, wind speed, precipitation, visibility) as measured and reported by fixed and/or mobile environmental sensors and aggregated by the data collector. Attributes relating to the data collection (and aggregation) are also included.
environmental sensor control	Data used to configure and control environmental sensors.
environmental sensor data	Current road conditions (e.g., surface temperature, subsurface temperature, moisture, icing, treatment status) and surface weather conditions (e.g., air temperature, wind speed, precipitation, visibility) as measured and reported by fixed and/or mobile environmental sensors. Operational status of the sensors is also included.
evacuation coordination	Coordination of information regarding a pending or in-process evacuation. Includes evacuation zones, evacuation times, evacuation routes, forecast network conditions, and reentry times.
evacuation information	Evacuation instructions and information including evacuation zones, evacuation times, and reentry times.
event confirmation	Confirmation that special event details have been received and processed.
event information	Special event information for travelers. This would include a broader array of information than the similar "event plans" that conveys only information necessary to support traffic management for the event.
event plans	Plans for major events possibly impacting traffic.
external reports	Traffic and incident information that is collected by the media through a variety of mechanisms (e.g., radio station call-in programs, air surveillance).
fare and price information	Current transit, parking, and toll fee schedule information.
freight equipment information	Container, trailer, or chassis information regarding identity, type, location, brake wear data, mileage, seal #, seal type, door open/close status, chassis bare/covered status, tethered / untethered status, temperature, humidity, power, battery levels, brake wear data, and bill of lading/information regarding the cargo/content.
hazmat notification	Information provided to emergency response organizations regarding a hazmat load including when cargo sensors detect an issue with the load such as a release of hazardous material. This information will include sensor information, vehicle identification, and carrier identification.
incident command information	Information for emergency personnel in the field that supports local tactical decision-making within an incident command system structure.
incident command information coordination	Information that supports local management of an incident. It includes resource deployment status, hazardous material information, traffic, road, and weather conditions, evacuation advice, and other information that enables emergency or maintenance personnel in the field to implement an effective, safe incident response.
incident command input	User input from emergency personnel including incident command status, incident information and resource coordination.
incident information	Notification of existence of incident and expected severity, location, time and nature of incident. As additional information is gathered and the incident evolves, updated incident information is provided. Incidents include any event that impacts transportation system operation ranging from routine incidents (e.g., disabled vehicle at the side of the road) through large-scale natural or human-caused disasters that involve loss of life, injuries, extensive property damage, and multi-jurisdictional response. This also includes special events, closures, and other planned events that may impact the transportation system.
incident information for media	Report of current desensitized incident information prepared for public dissemination through the media.



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Appendix D Interfaces

Flow Name	Flow Description
incident response coordination	Incident response procedures and current incident response status that are shared between allied response agencies to support a coordinated response to incidents. This flow provides current situation information, including a summary of incident status and its impact on the transportation system and other infrastructure, and current and planned response activities. This flow also coordinates a positive hand off of responsibility for all or part of an incident response between agencies.
incident response status	Status of the current incident response including a summary of incident status and its impact on the transportation system, traffic management strategies implemented at the site (e.g., closures, diversions, traffic signal control overrides), and current and planned response activities.
incident scene images	Real time images or video of an incident scene. This flow includes the images or video and meta data that describes the images.
incident scene status	Information gathered at the incident site that more completely characterizes the incident and provides current incident response status.
incident scene warning notification	Notification of an incident scene emergency or safety issue. This flow identifies that an incident scene emergency or safety issue has occurred so that warnings may be generated by more than one system in the work zone.
infrastructure monitoring sensor control	Data used to configure and control infrastructure monitoring sensors.
infrastructure monitoring sensor data	Data read from infrastructure-based sensors that monitor the condition or integrity of transportation infrastructure including bridges, tunnels, interchanges, pavement, culverts, signs, transit rail or guideway, and other roadway infrastructure. Includes sensor data and the operational status of the sensors.
infrastructure restriction warning notification	Notification to vehicle on-board equipment (OBE) that includes vehicle size (height, width, length) and weight as measured by infrastructure sensors, current infrastructure size and weight restrictions, and infrastructure restriction warning message(s) currently displayed on roadside signs.
interactive traveler information	Traveler information provided in response to a traveler request. The provided information includes traffic and road conditions, advisories, incidents, restrictions, payment information, transit services, parking information, weather information, and other travel-related data updates and confirmations.
intermodal freight archive data	Information describing demand at intermodal freight terminals including loading/unloading activities of trailers and containers. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
intersection infringement info	Vehicle path information sent by a vehicle that is performing an unpermitted movement at an intersection such as a stop sign violation or running a red light. This also includes information about possible conflicts with other road users in the vehicle's path, including a range of uncontrolled intersection scenarios that could be covered by this flow. This flow does not include permanent ids; only temporary ones that allow monitoring of the vehicle as it moves across the intersection.
intersection safety warning	A warning of an imminent unsafe vehicle infringement at an intersection that may endanger other vehicles or pedestrians. This allows vehicles approaching the intersection to be warned in the event of an imminent red light or stop sign violation or potential infringement on an occupied crosswalk. All connected vehicles and personal devices near the intersection receive the warning.
lane closure information	Lane closure information provided to passing vehicles. This flow provides information about roadway configuration changes such as lane closures and shifts.
local METR information for users	This flow supports the provision of METR information to METR Consumer Systems based on their proximity to a localized transmitter.
local signal preemption request	Direct control signal or message to a signalized intersection that results in preemption of the current control plan and grants right-of-way to the requesting vehicle.
local signal priority request	Request from a vehicle to a signalized intersection for priority at that intersection. This flow also allows the vehicle to cancel a priority request (for example, when the vehicle clears the intersection).
local situation data	This general flow represents the traffic, environmental, and emissions situation data that is collected from connected vehicles by an RSE, aggregated, filtered, and provided to a back-office center. It also includes data collected from ITS roadway equipment that provides current intersection and road network status for the area proximate to the RSE.
logged vehicle routes	Anticipated route information for guided vehicles, special vehicles (e.g., oversize vehicles) or groups of vehicles (e.g., governor's motorcade) that may require changes in traffic control strategy.



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Appendix D Interfaces

Flow Name	Flow Description
maint and constr archive data	Information describing road construction and maintenance activities identifying the type of activity, the work performed, and work zone information including work zone configuration and safety (e.g., a record of intrusions and vehicle speeds) information. For construction activities, this information also includes a description of the completed infrastructure, including as-built plans as applicable. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
maint and constr resource request	Request for road maintenance and construction resources that can be used in the diversion of traffic (cones, portable signs), clearance of a road hazard, repair of ancillary damage, or any other incident response. The request may poll for resource availability or request pre-staging, staging, or immediate dispatch of resources.
maint and constr resource response	Current status of maintenance and construction resources including availability and deployment status. General resource inventory information covering vehicles, equipment, materials, and people and specific resource deployment status may be included.
maint and constr work plans	Future construction and maintenance work schedules and activities including anticipated closures with anticipated impact to the roadway, alternate routes, anticipated delays, closure times, and durations.
maintenance and repair needs	Recommended strategies and schedules for maintenance of the transportation infrastructure.
parking archive data	Data used to analyze and monitor trends in parking demand, pricing, and operational actions. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
parking information	General parking information and status, including current parking availability, parking pricing, and parking space availability information, including features like number and type of electric charging spots.
payment instructions	Information provided to configure and support fixed point payment operations including pricing information, user account information, and operational parameters used to control equipment that controls access, collects payment, and detects and processes violations.
payment transactions	Detailed list of transactions including violations. Each transaction includes the date/time, vehicle/customer, and transaction amount. Additional information is included to support delayed payment and violation processing.
permission application	A request for permission to access a Connected Vehicle service by an end-user that requires enrollment. This may include services granted to drivers of low emissions vehicles or pedestrians with special needs that require extended crossing times for example.
personal transit information	General and personalized transit information for a particular fixed route, flexible route, or paratransit system.
queue warning information	Information regarding formed or impending queues (location of the end of queue, estimated duration of the queue, and other descriptions of the queue condition) and recommendations for upstream vehicles including speed reduction, lane change, or diversion recommendations.
reduced speed warning info	Real time notification of vehicle detections, measured vehicle characteristics (e.g., vehicle height), speed measurements, and warnings issued by roadway infrastructure. This flow can also include roadway configuration data, current speed limits, and warning parameters and thresholds enabling local speed management application configuration and management.
remote surveillance control	The control commands used to remotely operate another center's sensors or surveillance equipment so that roadside surveillance assets can be shared by more than one agency.
resource coordination	Coordination of resource inventory information, specific resource status information, resource prioritization and reallocation between jurisdictions, and specific requests for resources and responses that service those requests.
resource deployment status	Status of resource deployment identifying the resources (vehicles, equipment, materials, and personnel) available and their current status. General resource inventory information and specific status of deployed resources may be included.
resource request	A request for resources to implement special traffic control measures, assist in clean up, verify an incident, etc. The request may poll for resource availability or request pre-staging, staging, or immediate deployment of resources. Resources may be explicitly requested or a service may be requested and the specific resource deployment may be determined by the responding agency.
restricted lanes information	This flow defines the location, duration, and operating parameters for lanes that are reserved for the exclusive use of certain types of vehicles (e.g., transit vehicles) or vehicles that meet other qualifications (e.g., number of occupants, low emissions criteria). It identifies the lane(s), the start and stop locations, start and end times, vehicle restrictions, speed limits and platooning parameters.



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Flow Name	Flow Description
road closure information	Road closure information provided to passing vehicles. This flow provides information about the road closure with diversion information.
road network conditions	Current and forecasted traffic information, road and weather conditions, and other road network status. Either raw data, processed data, or some combination of both may be provided by this flow. Information on diversions and alternate routes, closures, and special traffic restrictions (lane/shoulder use, weight restrictions, width restrictions, HOV requirements) in effect is included.
road network status assessment	Assessment of damage sustained by the road network including location and extent of the damage, estimate of remaining capacity, required closures, alternate routes, necessary restrictions, and time frame for repair and recovery.
road pricing equipment status	Provides an indication of the operational status of the road pricing data collection equipment in a vehicle. Also indicates vehicle ID (VIN) so that the registration of the equipment to a specific vehicle can be verified and confirmed by comparison with vehicle characteristics.
road use charges	Road use charges per link.
road use history	A vehicle's road use history that records where the vehicle has traveled over time. Optionally includes vehicle speeds as well as distance traveled for some applications. Information is accurate enough to distinguish between adjacent roads, adjacent lanes, and identify direction of travel on the roads.
road weather advisories	Segment-specific weather and road conditions including real-time advisories of deteriorating road and weather conditions, medium-term advisories for the next 2-12 hours, and long-term advisories more than 12 hours into the future. The advisories may include advisories that are issued based on locally collected environmental data (e.g., an ice on bridge advisory).
road weather information	Road conditions and weather information that are made available by road maintenance operations to other transportation system operators.
roadside archive data	A broad set of data derived from roadside sensors that includes current traffic conditions, environmental conditions, and any other data that can be directly collected by roadside sensors. This data also indicates the status of the sensors and reports of any identified sensor faults.
roadway dynamic signage data	Information used to initialize, configure, and control dynamic message signs. This flow can provide message content and delivery attributes, local message store maintenance requests, control mode commands, status queries, and all other commands and associated parameters that support remote management of these devices.
roadway dynamic signage status	Current operating status of dynamic message signs.
roadway maintenance status	Summary of maintenance fleet operations affecting the road network. This includes the status of winter maintenance (snow plow schedule and current status).
safety status information	Safety information such as safety ratings, security ratings or flags, inspection summaries, and violation summaries. A unique identifier is included. Corresponds to the safety and security portion of CVISN "snapshots." The status information may be provided as a response to a real-time query or as a result of a standing request for updated information (subscription). This may also include information about non-U.S. fleets for use by U.S. authorities, and information regarding U.S. fleets made available to Mexican and Canadian authorities. The query flow is not explicitly shown.
service advertisement	An advertisement of available services and identification of how those services may be accessed (e.g., RF parameters, identifiers, etc.). Services include network services such as IPv6 routing, public roadside services such as intersection safety, back office services including situation data services and security credentials, or private services.
service patrol dispatch request	Service patrol dispatch instructions including incident location and available information concerning the incident.
service patrol dispatch response	Request for additional dispatch information and provision of en route status.
service patrol incident status	Information gathered at the incident site by a service patrol vehicle that more completely characterizes the incident, the services provided, and clearance status.
signal control commands	Control of traffic signal controllers or field masters including clock synchronization.
signal control device configuration	Data used to configure traffic signal control equipment including local controllers and system masters.
signal control plans	Traffic signal timing parameters including minimum green time and interval durations for basic operation and cycle length, splits, offset, phase sequence, etc. for coordinated systems.
signal control status	Operational and status data of traffic signal control equipment including operating condition and current indications.



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Appendix D Interfaces

Flow Name	Flow Description
signal fault data	Faults reported by traffic signal control equipment.
signal priority status	In response to a request for signal priority, this flow indicates the status of the priority or preemption request.
signal system configuration	Data used to configure traffic signal systems including configuring control sections and mode of operation (time based or traffic responsive).
speed management information	Target speeds, speed advisories, and/or speed limit information provided to a vehicle. The information includes the current speed value(s), the route segment(s) and lane(s) where the speeds apply, and an indication of whether the speeds are suggested target speeds, posted advisory speeds, or enforceable speed limit values. This flow may also include information about the reason for reduced speeds and provide target lane information if lane changes are required.
stolen vehicle signal activation	Command to remotely enable a radio transmitter onboard a specific stolen vehicle to begin transmitting a radio signal that can be used to identify a bearing to the vehicle to support vehicle recovery.
traffic archive data	Information describing the use and vehicle composition on transportation facilities and the traffic control strategies employed. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
traffic detector control	Information used to configure and control traffic detector systems such as inductive loop detectors and machine vision sensors.
traffic detector data	Raw and/or processed traffic detector data which allows derivation of traffic flow variables (e.g., speed, volume, and density measures) and associated information (e.g., congestion, potential incidents). This flow includes the traffic data and the operational status of the traffic detectors
traffic gap information	Measured gap to the next approaching vehicle per lane and direction of travel
traffic images	High fidelity, real-time traffic images suitable for surveillance monitoring by the operator or for use in machine vision applications. This flow includes the images. Meta data that describes the images is contained in another flow.
traffic information for media	Report of traffic conditions including traffic incident reports for public dissemination through the media. The reports may also include information on diversions and alternate routes, closures, and special traffic restrictions in effect.
traffic metering status	Current operational status and operating parameters for ramp meters, interchange meters, mainline meters and other control equipment associated with roadway metering operations.
transit and fare schedules	Transit service information including routes, schedules, and fare information. This also includes on-demand service information.
transit fare information	Information provided by transit management that supports fare payment transactions.
transit information user request	Request for special transit routing, real-time schedule information, and availability information.
transit schedule adherence information	Dynamic transit schedule adherence and transit vehicle location information.
transportation system status	Current status and condition of transportation infrastructure (e.g., tunnels, bridges, interchanges, TMC offices, maintenance facilities). In case of disaster or major incident, this flow provides an assessment of damage sustained by the surface transportation system including location and extent of the damage, estimate of remaining capacity and necessary restrictions, and time frame for repair and recovery.
traveler alerts	Traveler information alerts reporting congestion, incidents, adverse road or weather conditions, restrictions, vehicle requirements, parking availability, transit service delays or interruptions, and other information that may impact the traveler. Relevant alerts are provided based on traveler-supplied profile information including trip characteristics and preferences.
traveler archive data	Data associated with traveler information services including service requests, facility usage, rideshare, routing, and traveler payment transaction data. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.
traveler information for media	General traveler information regarding incidents, unusual traffic conditions, transit issues, or other advisory information that has been desensitized and provided to the media.
traveler request	A request for traveler information including traffic, transit, toll, parking, road weather conditions, event, and passenger rail information. The request identifies the type of information, the area of interest, parameters that are used to prioritize or filter the returned information, and sorting preferences.



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Flow Name	Flow Description
trip request	Request for trip planning services that identifies the trip origin, destination(s), timing, preferences, and constraints. The request may also include the requestor's location or a request for transit and parking reservations, electric charging station access, and ridesharing options associated with the trip. The trip request also covers requests to revise a previously planned trip and interim updates that are provided as the trip is interactively planned.
user profile	Information provided to register for a travel service and create a user account. The provided information includes personal identification, traveler preferences (e.g., travel mode, micro-mobility options, accessibility needs, and assistance needs), priorities for the preferences, device information, a user ID and password, and information to support payment transactions, if applicable.
vehicle cluster coordination	Coordination between CACC-equipped vehicles that enable formation and management of strings of adjacent equipped vehicles that coordinate speed management across the string. This flow includes coordination between CACC-equipped vehicles that enable adjacent vehicles in the same lane to identify each other and couple. Depending on the CACC implementation, this flow also supports identification of the lead vehicle in the string, operating performance parameters for the string, destination information so that drivers can join strings that share their destination, and coordination so that strings of vehicles are ordered based on the individual weight and performance profile of each participating vehicle. This flow also supports dissolution of CACC vehicle strings as vehicles depart from the string.
vehicle collision information	The current status of the vehicle systems following a collision including air bag deployment, number of passengers, seat belt usage, sensor data that indicates crash severity (e.g., Delta V speed profile during the crash, vehicle damage, number of impacts), and vehicle type/make/model.
vehicle environmental data	Data from vehicle safety and convenience systems that can be used to estimate environmental and infrastructure conditions, including measured air temperature, exterior light status, wiper status, sun sensor status, rain sensor status, traction control status, anti-lock brake status, vertical acceleration and other collected vehicle system status and sensor information. The collected data is reported along with the location, heading, and time that the data was collected. Both current data and snapshots of recent events (e.g., traction control or anti-lock brake system activations) may be reported.
vehicle location and motion	Data describing the vehicle's location in three dimensions, heading, speed, acceleration, braking status, and size.
vehicle location and motion for surveillance	Data describing the vehicle's location in three dimensions, heading, speed, acceleration, braking status, and size. This flow represents monitoring of basic safety data ('vehicle location and motion') broadcast by passing connected vehicles for use in vehicle detection and traffic monitoring applications.
vehicle payment information	Information provided for payment of tolls, parking, and other transportation fees including identification that can be used to identify the payment account or source and related vehicle and service information that are used to determine the type and price of service requested. This flow supports one-time payments that may not be associated with a service account. See also 'actuate secure payment'. The information exchange normally supports an account debit to pay fees, but an account credit may be initiated where pricing strategies include incentives.
vehicle payment update	Data written to vehicle equipment to support electronic toll collection or parking payment.
vehicle platoon coordination	Coordination of control commands between leader and follower vehicles allowing vehicles to join, coordinate with, and separate from platoons of cooperative vehicles. This flow shares platoon size, location, and performance parameters (e.g., platoon speed and spacing) between platooned vehicles. It also coordinates maneuvers between platooned vehicles, including maneuvers as vehicles join and leave the platoon.
vehicle profile	Information about a vehicle such as vehicle make and model, fuel type, engine type, size and weight, vehicle performance and level of control automation, average emissions, average fuel consumption, passenger occupancy, or other data that can be used to classify vehicle eligibility for access to specific lanes, road segments, or regions or participation in cooperative vehicle control applications.
vehicle security status	Vehicle location and current status information that is used to remotely monitor unattended vehicles for potential break in, theft, or other malicious acts. Status information is updated when the vehicle alarm is activated, the vehicle is physically touched, jostled, or entered, the vehicle is started, or the vehicle is moved.



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Flow Name	Flow Description
vehicle situation data	This flow represents vehicle snapshots that may be provided by the vehicle to support traffic and environmental conditions monitoring. Snapshots are collected by the vehicle for specific events (e.g., when a sensor exceeds a threshold) or periodically and reported based on control parameters when communications is available. Traffic-related data includes snapshots of measured speed and heading and events including starts and stops, speed changes, and other vehicle control events. Environmental data may include measured air temperature, exterior light status, wiper status, sun sensor status, rain sensor status, traction control status, anti-lock brake status, and other collected vehicle system status and sensor information. The collected data is reported along with the location, heading, and time that the data was collected.
video surveillance control	Information used to configure and control video surveillance systems.
wayfinding request	Request for wayfinding planning services that identifies the trip origin, destination(s), timing, preferences, and constraints. The request may also include customization of the request based on a traveler profile as well as the requestor's location. The wayfinding request also covers requests to revise a previously planned wayfinding plan and interim updates that are provided as the wayfinding portion of an overall trip is interactively planned.
work plan feedback	Comments and suggested changes to proposed construction and maintenance work schedules and activities. This information influences work plan schedules so that they minimize impact to other system operations and the overall transportation system.
work zone information	Summary of maintenance and construction work zone activities affecting the road network including the nature of the maintenance or construction activity, location, impact to the roadway, expected time(s) and duration of impact, anticipated delays, alternate routes, and suggested speed limits. This information may be augmented with images that provide a visual indication of current work zone status and traffic impacts.
work zone warning notification	Notification of a work zone emergency or safety issue. This flow identifies that a work zone emergency or safety issue has occurred so that warnings may be generated by more than one system in the work zone.
wrong way vehicle detected	Notification that a vehicle has been detected traveling in the wrong direction. This can be a direct report by an equipped vehicle that is being driven in the wrong direction or a report of a non-equipped vehicle that has been detected traveling in the wrong direction. It includes the current location, speed, acceleration, and heading of the wrong way vehicle.



STATEWIDE ITS ARCHITECTURE CONTEXT DIAGRAMS

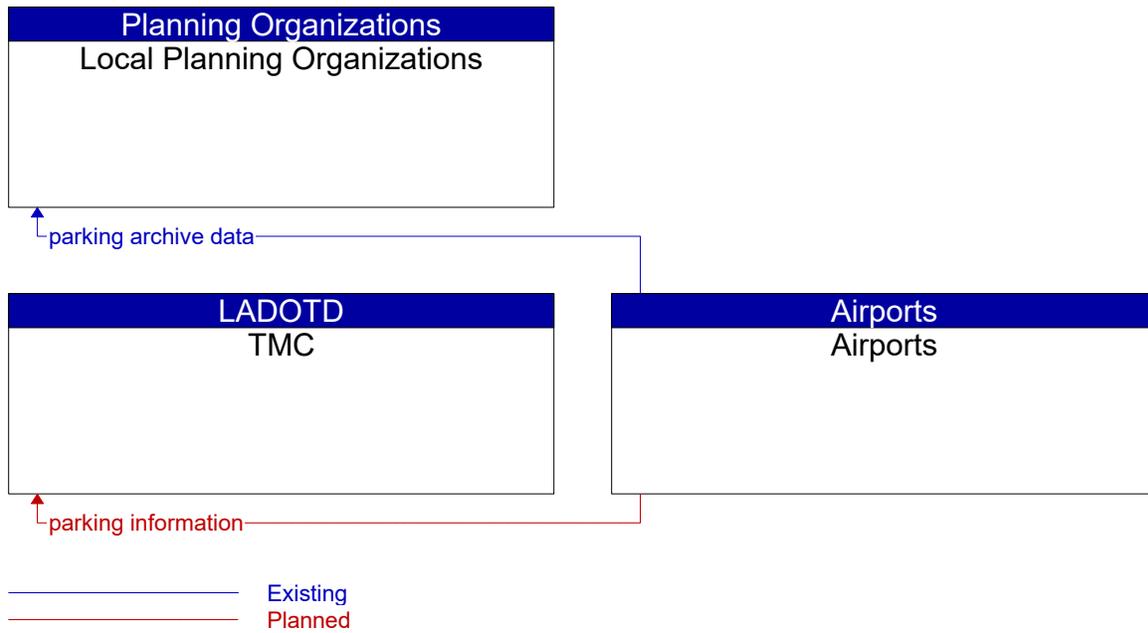


Figure 3: Airports Context Diagram



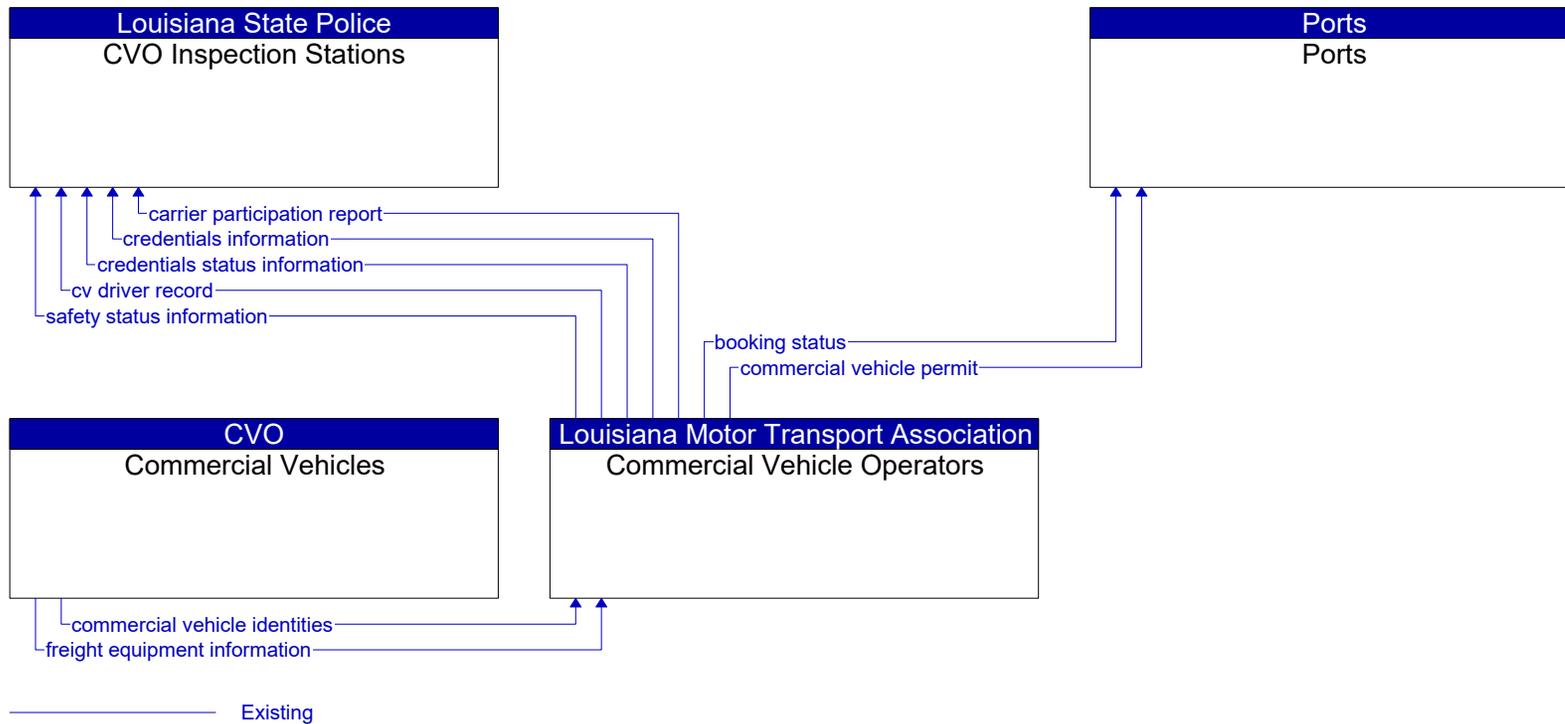


Figure 4: Commercial Vehicle Operators Context Diagram



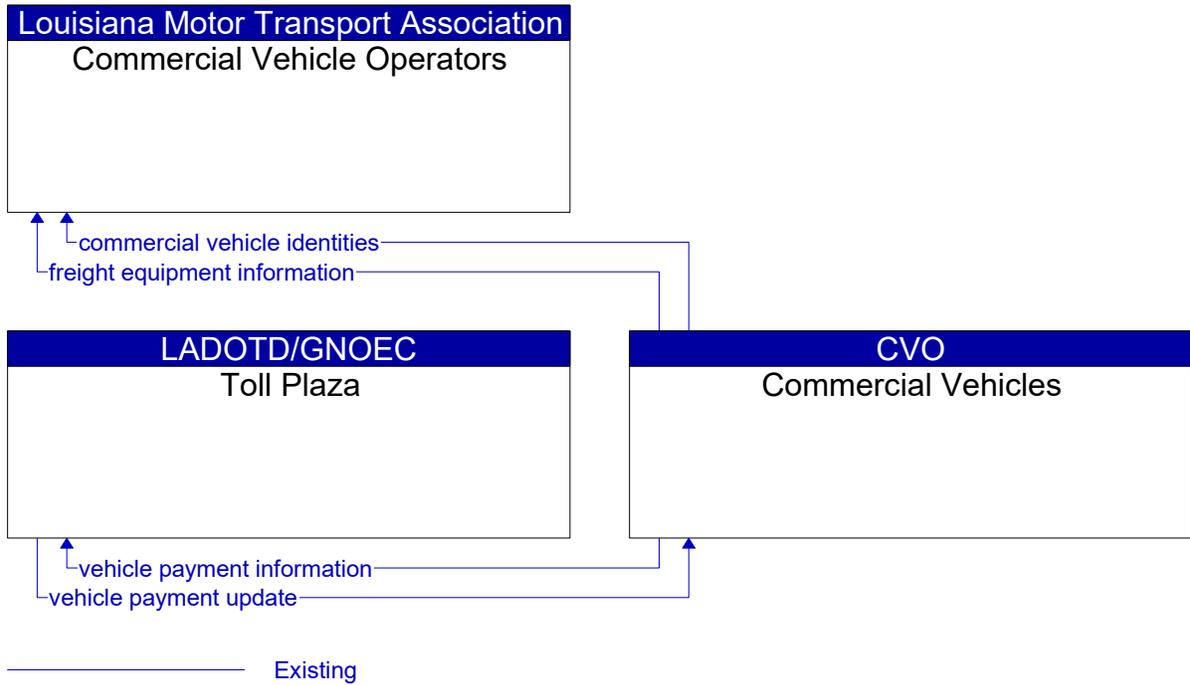


Figure 5: Commercial Vehicles Context Diagram



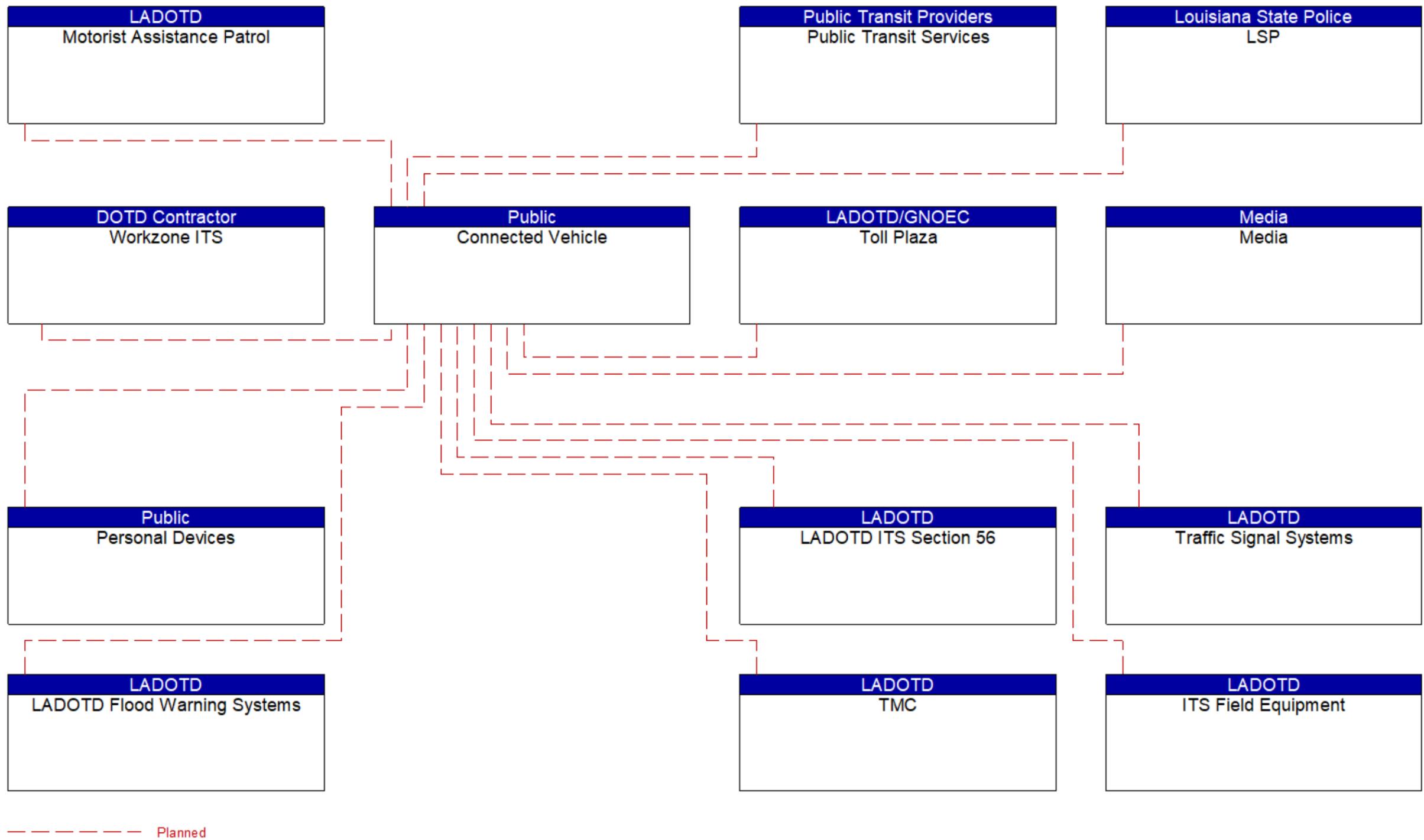


Figure 6: Connected Vehicle Context Diagram



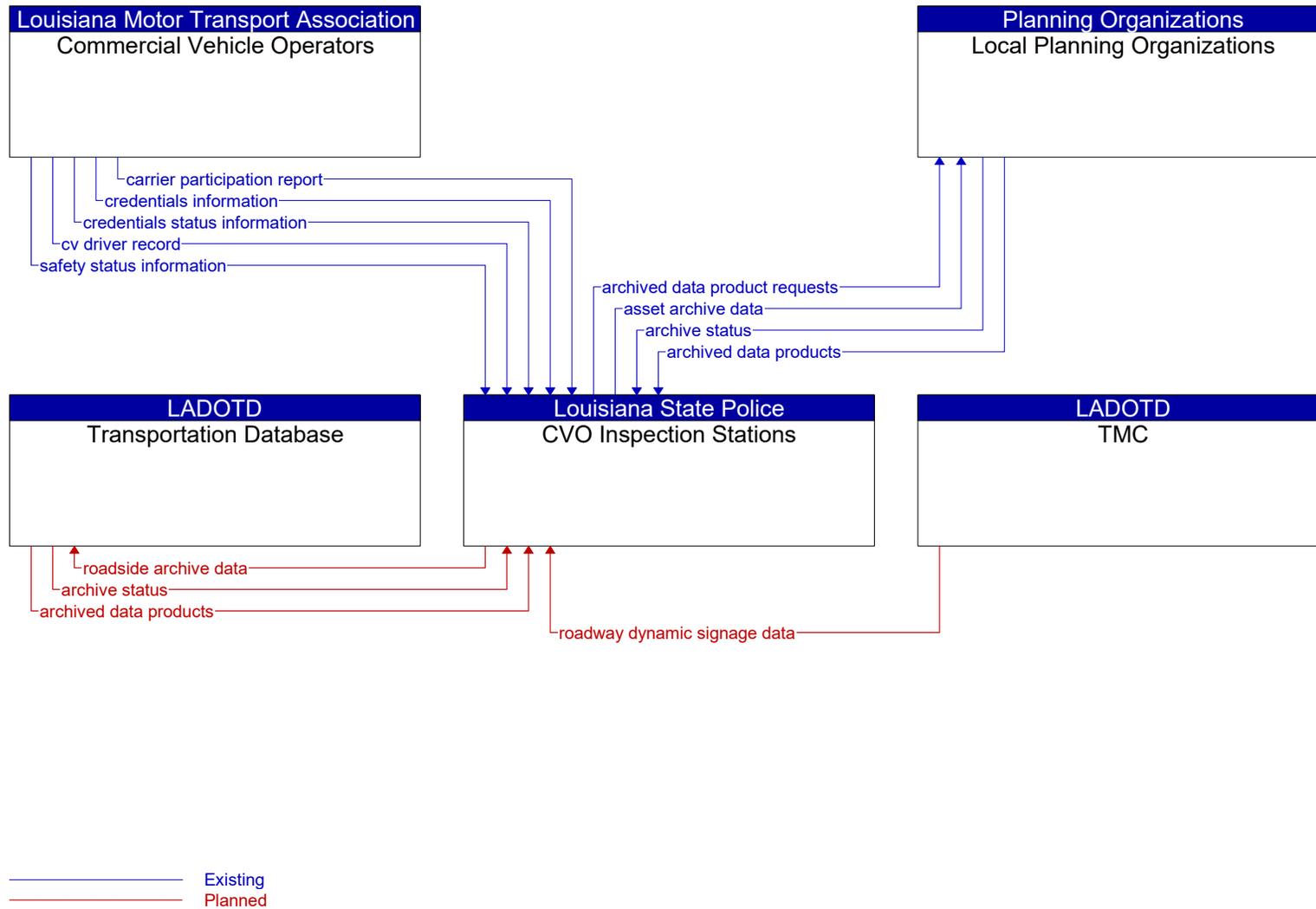


Figure 7: CVO Inspection Stations Context Diagram



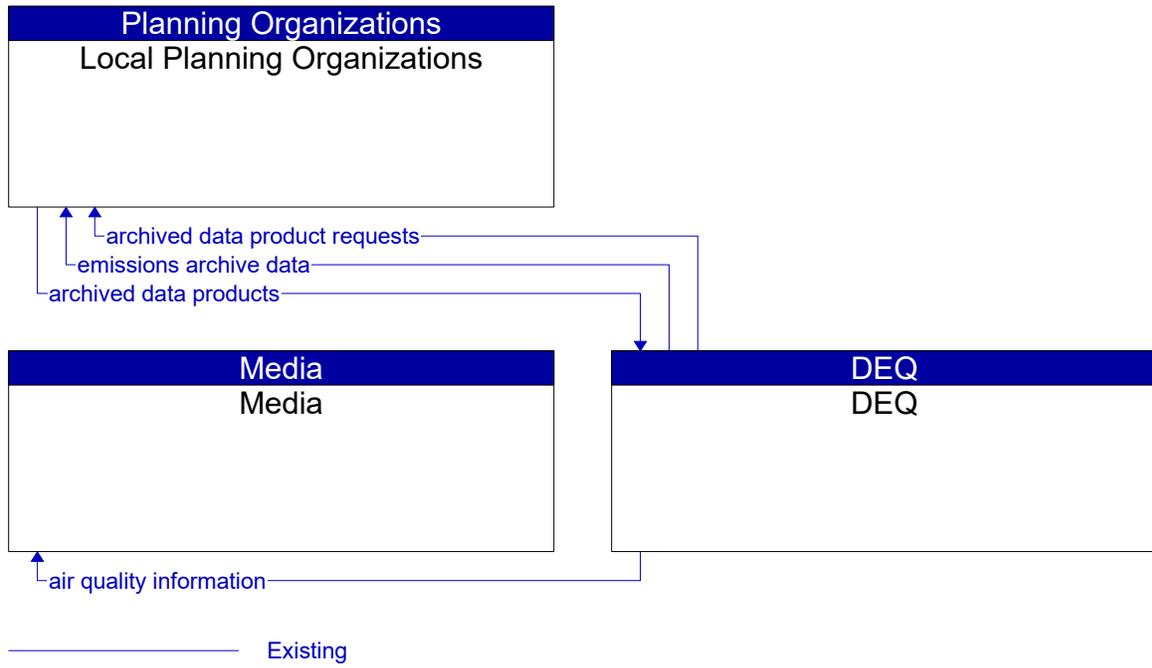


Figure 8: DEQ Context Diagram



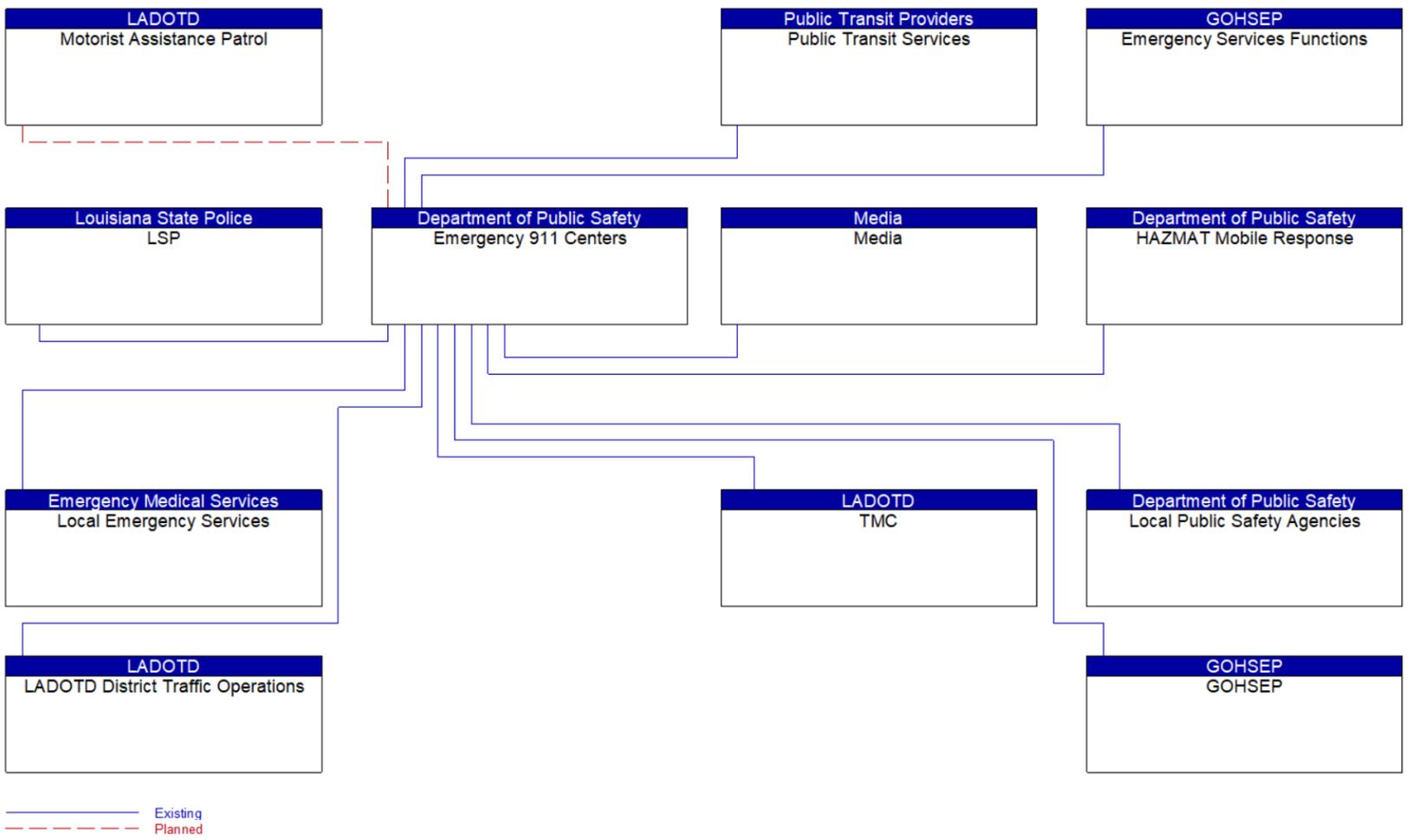


Figure 9: Emergency 911 Centers Context Diagram

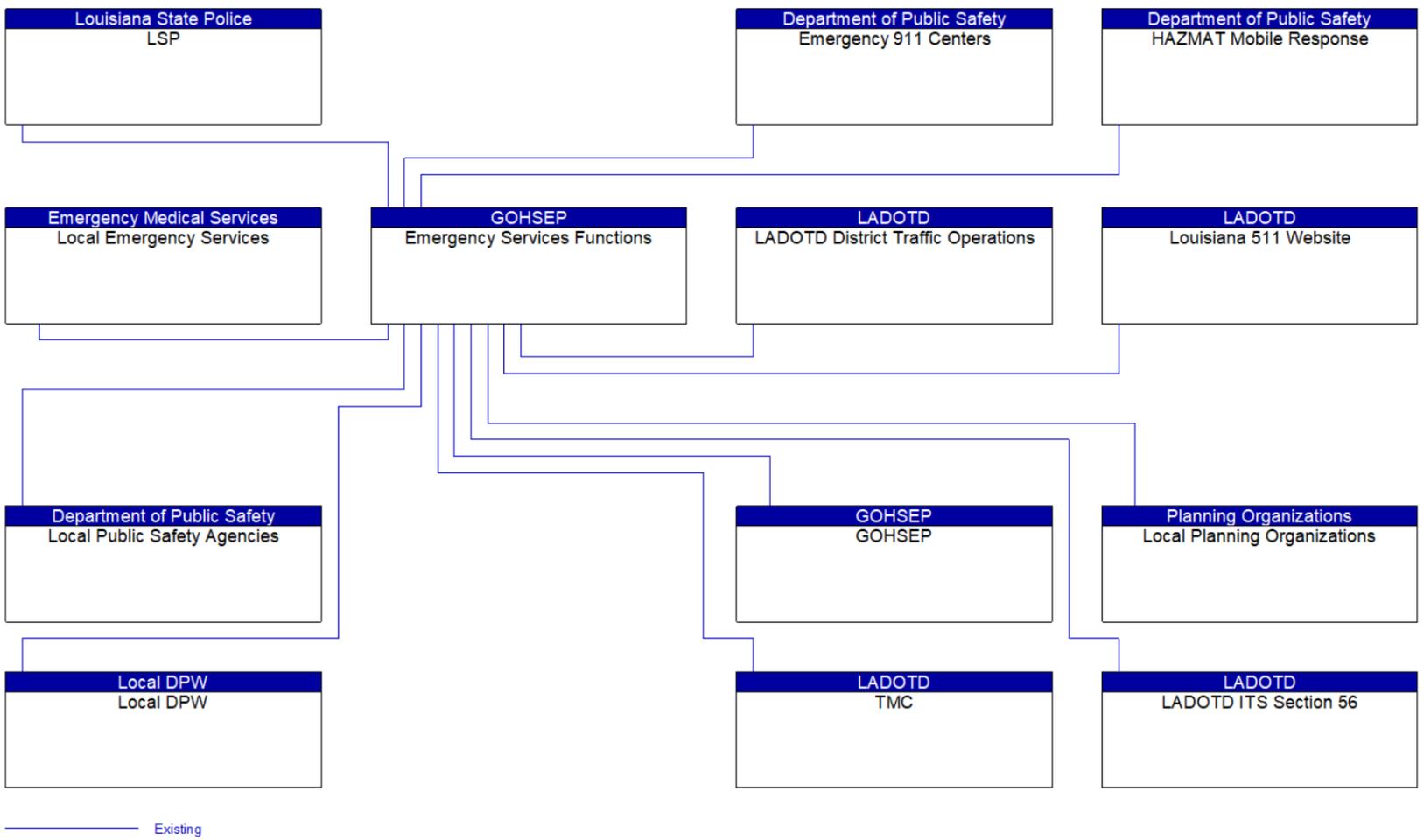


Figure 10: Emergency Services Functions Context Diagram



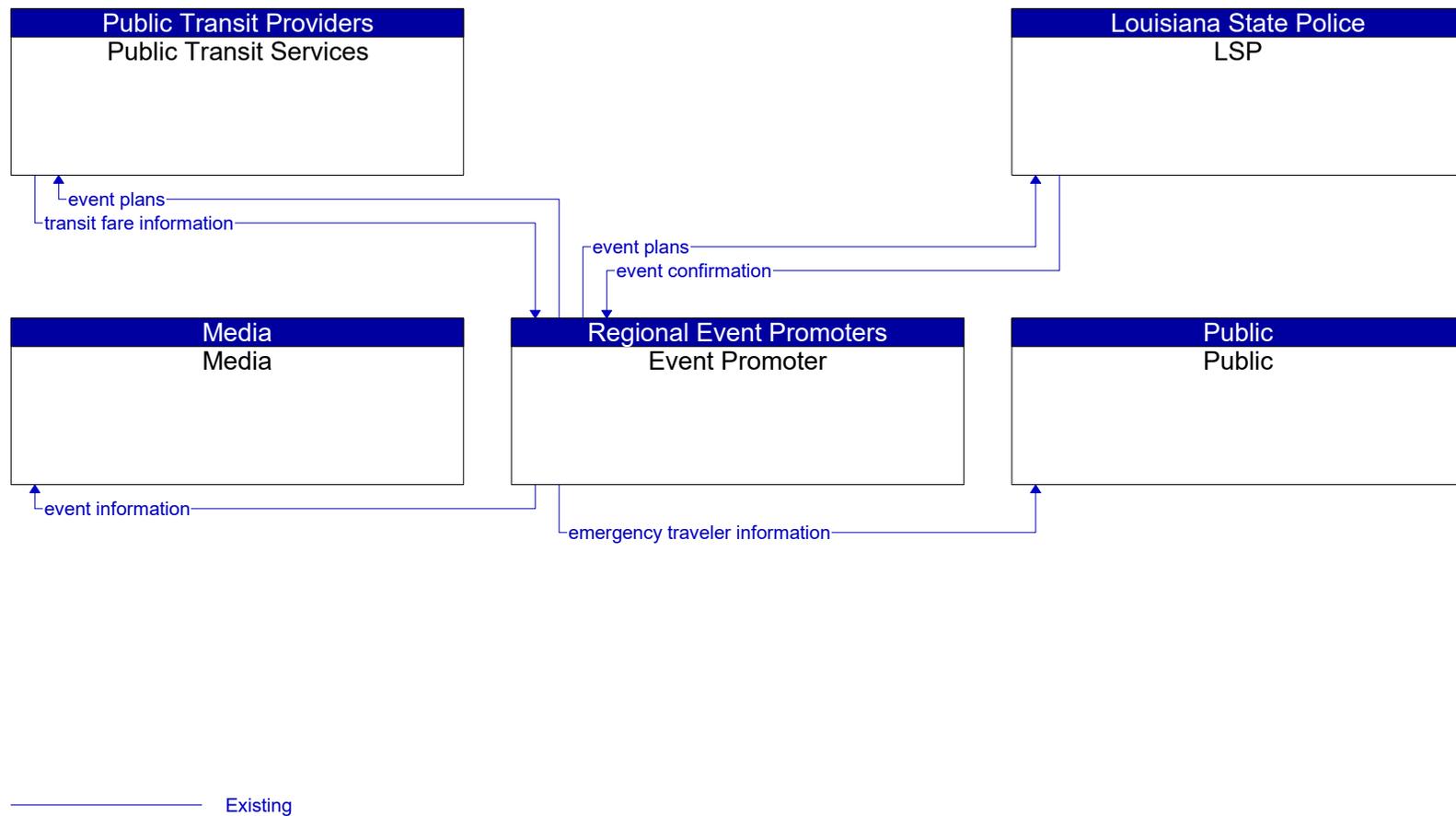


Figure 11: Event Promoter Context Diagram



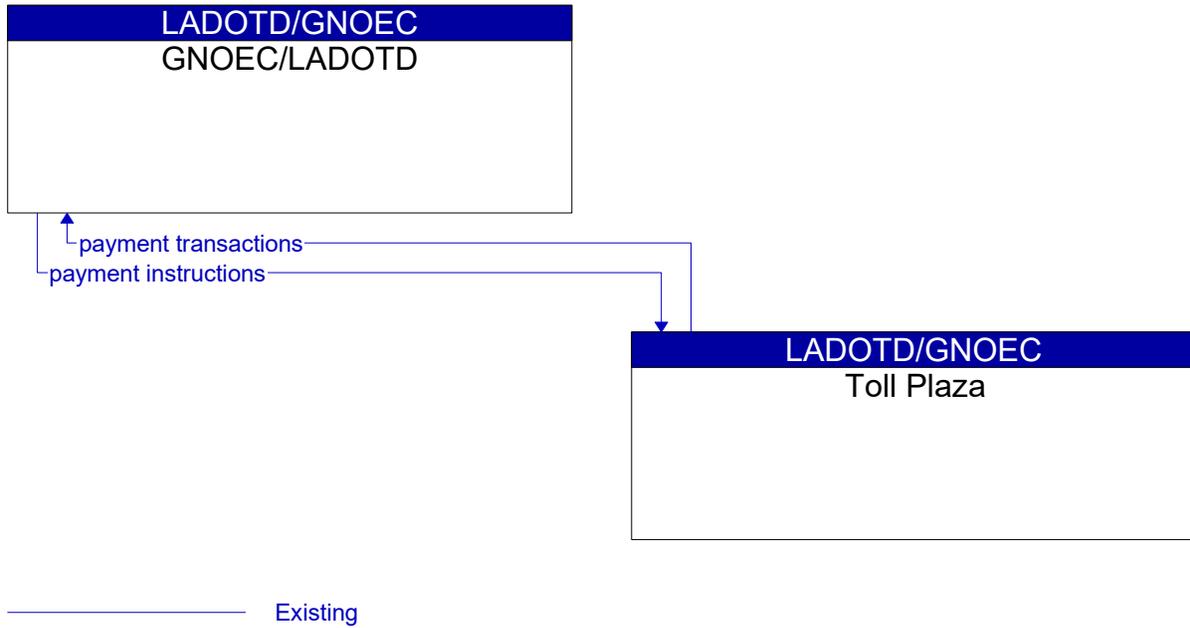


Figure 12: GNOEC/LADOTD Context Diagram



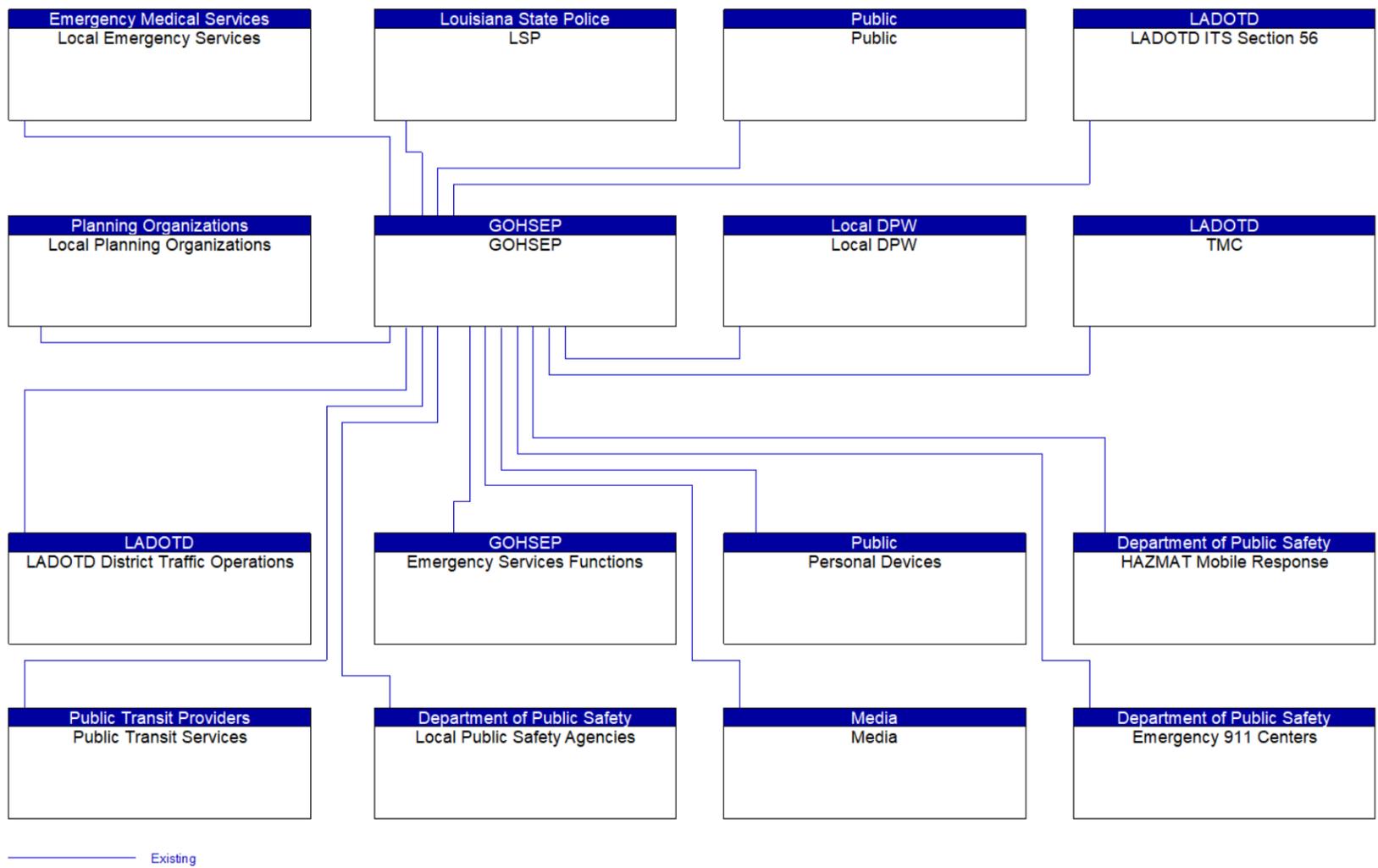


Figure 13: GOHSEP Context Diagram



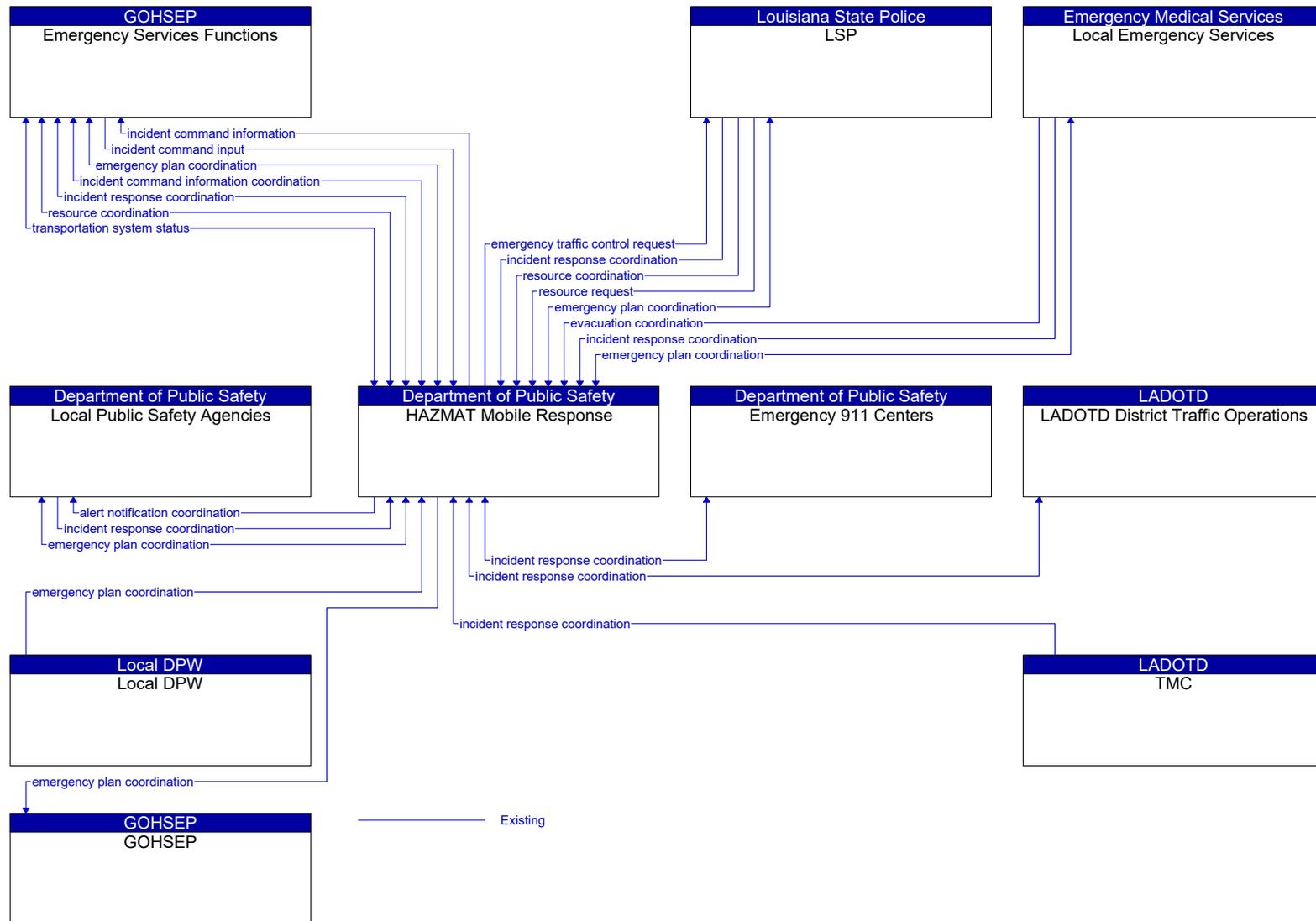


Figure 14: HAZMAT Mobile Response Context Diagram



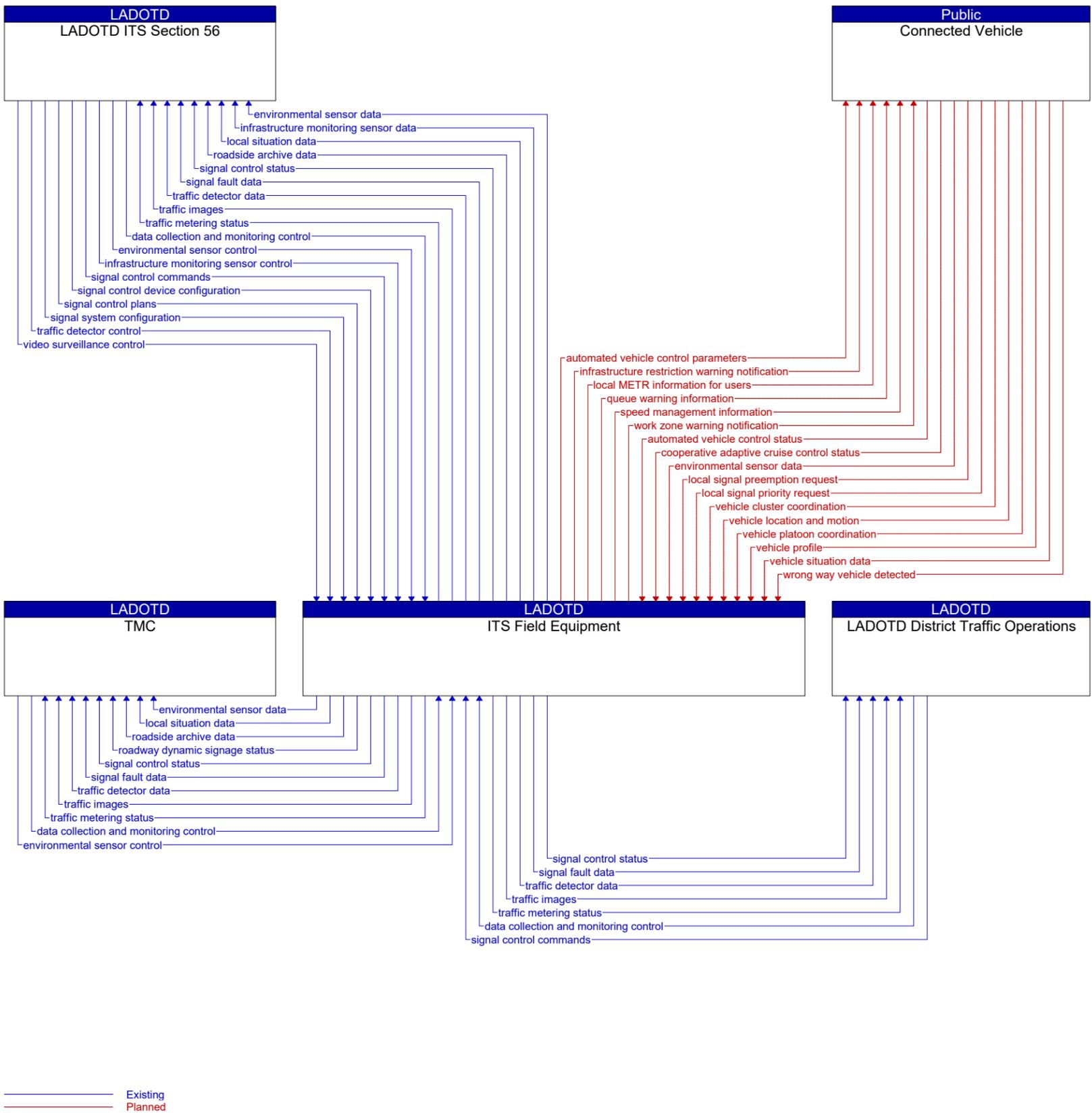


Figure 15: ITS Field Equipment Context Diagram



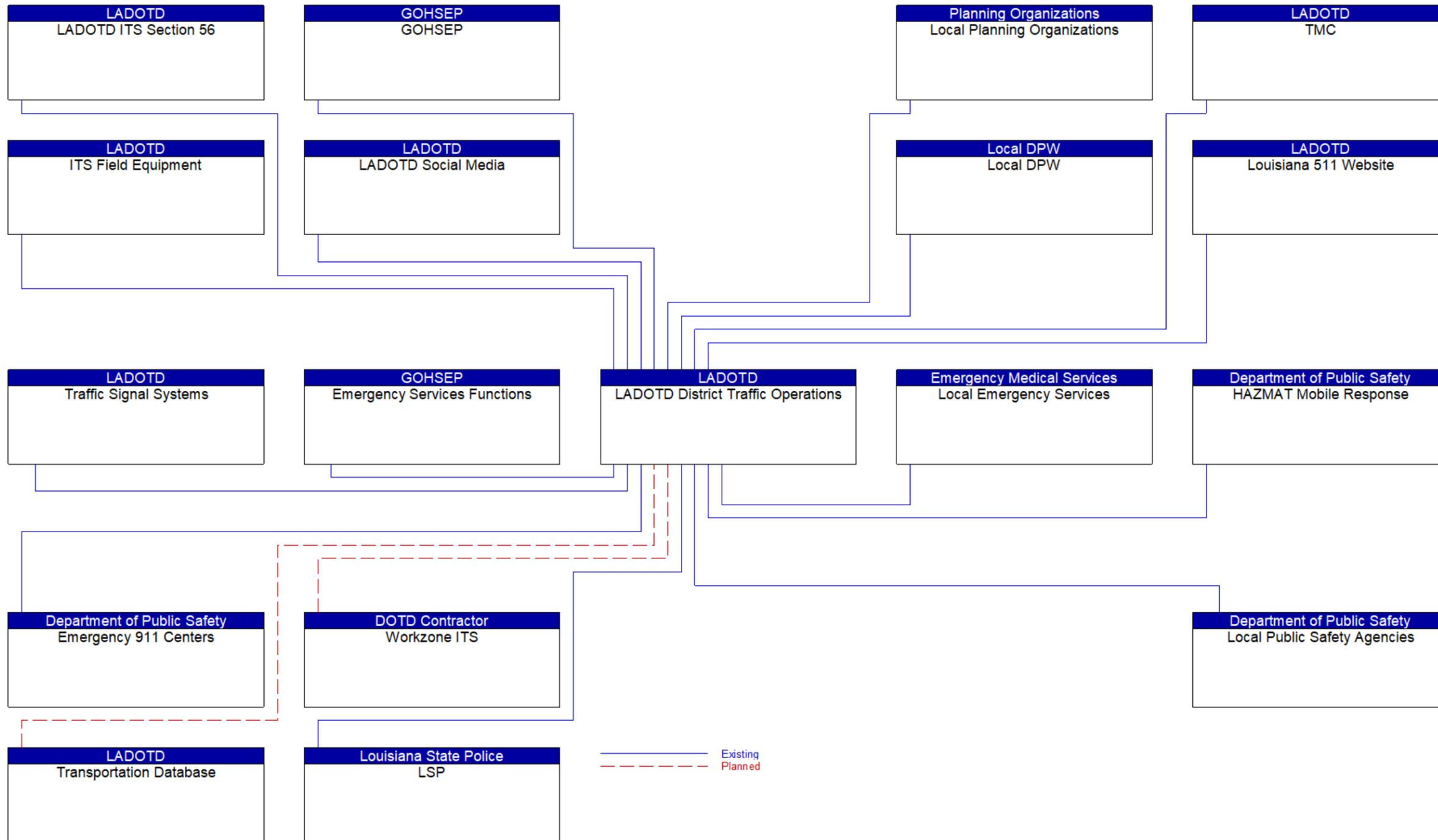


Figure 16: LADOTD District Traffic Operations Context Diagram



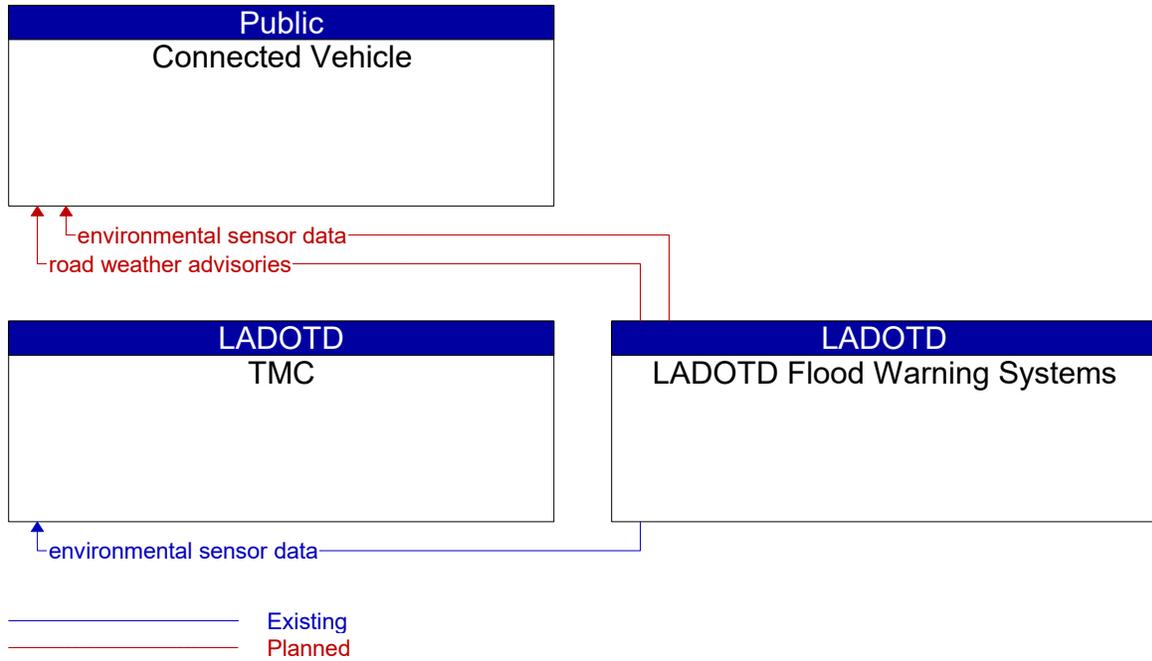


Figure 17: LADOTD Flood Warning Systems Context Diagram



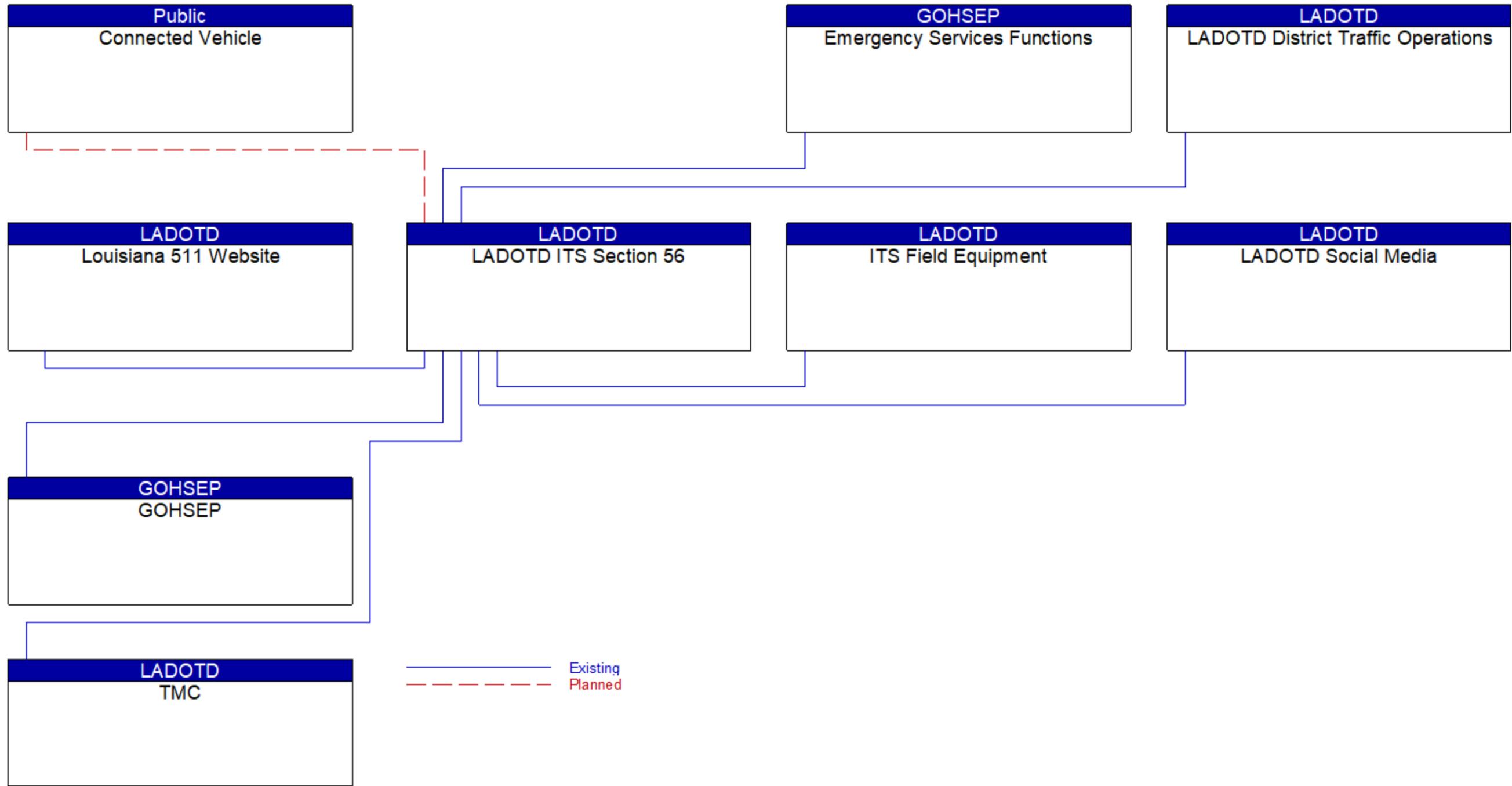


Figure 18: LADOTD ITS Section 56 Context Diagram



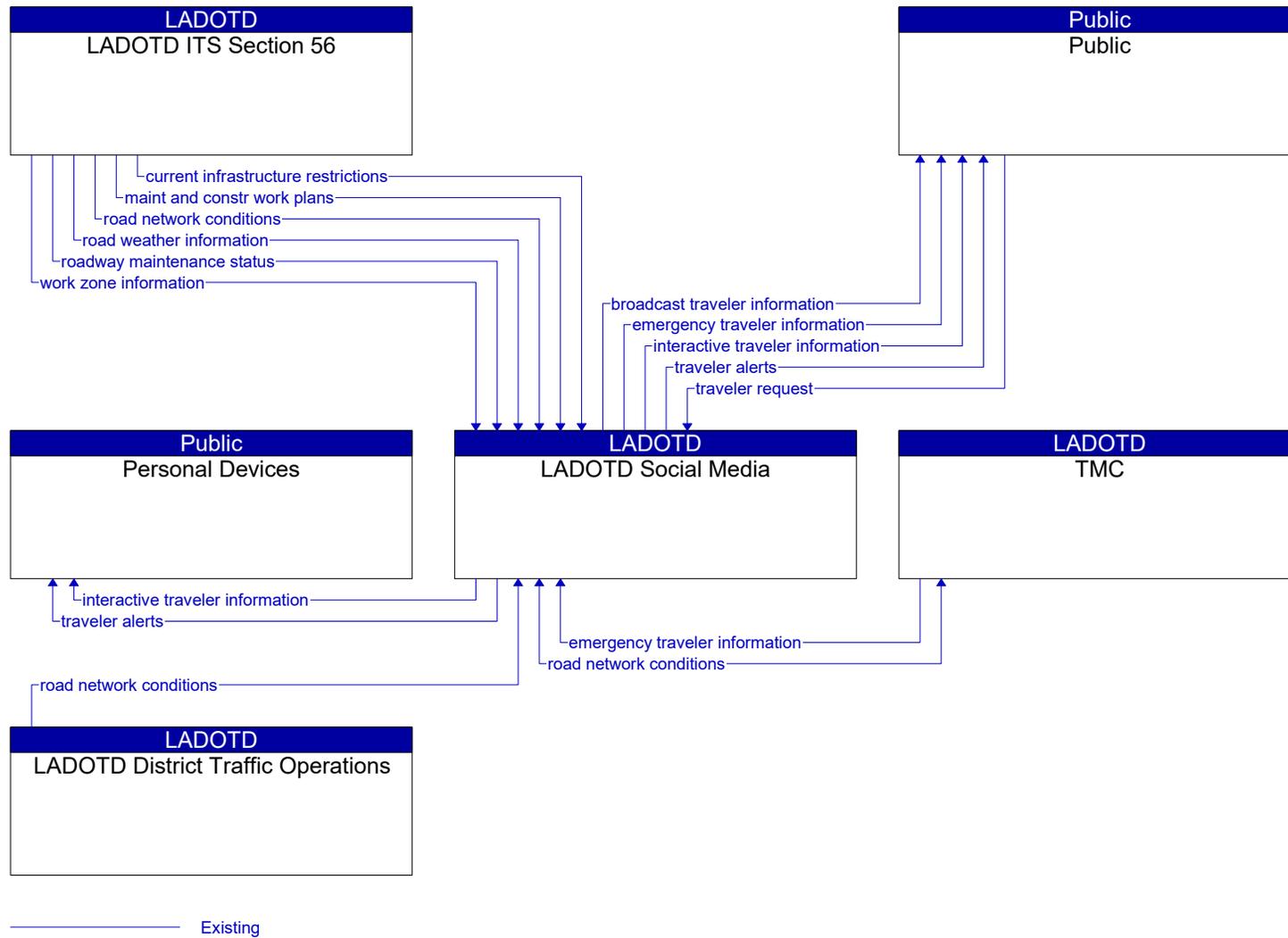


Figure 19: LADOTD Social Media Context Diagram



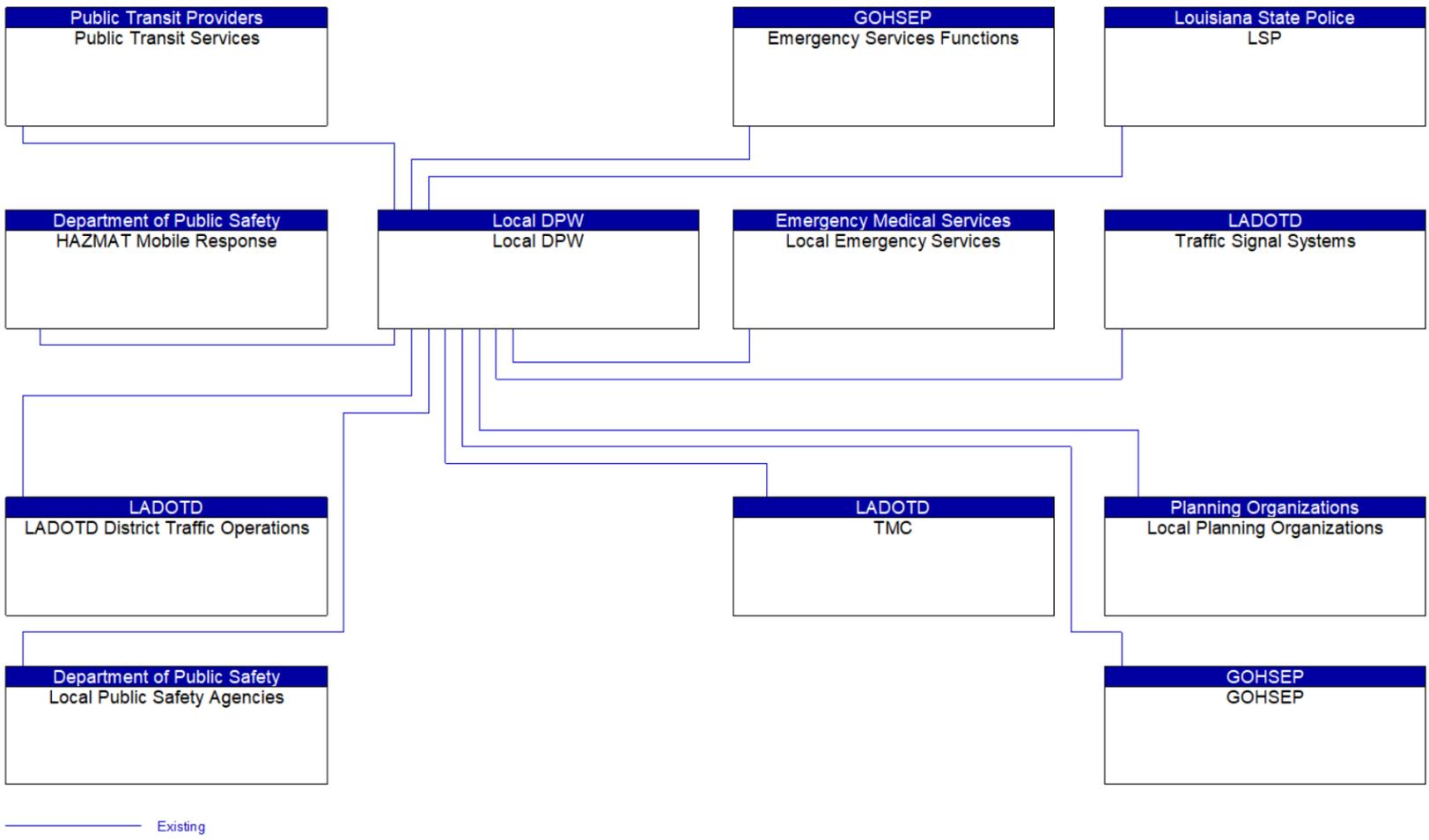


Figure 20: Local DPW Context Diagram

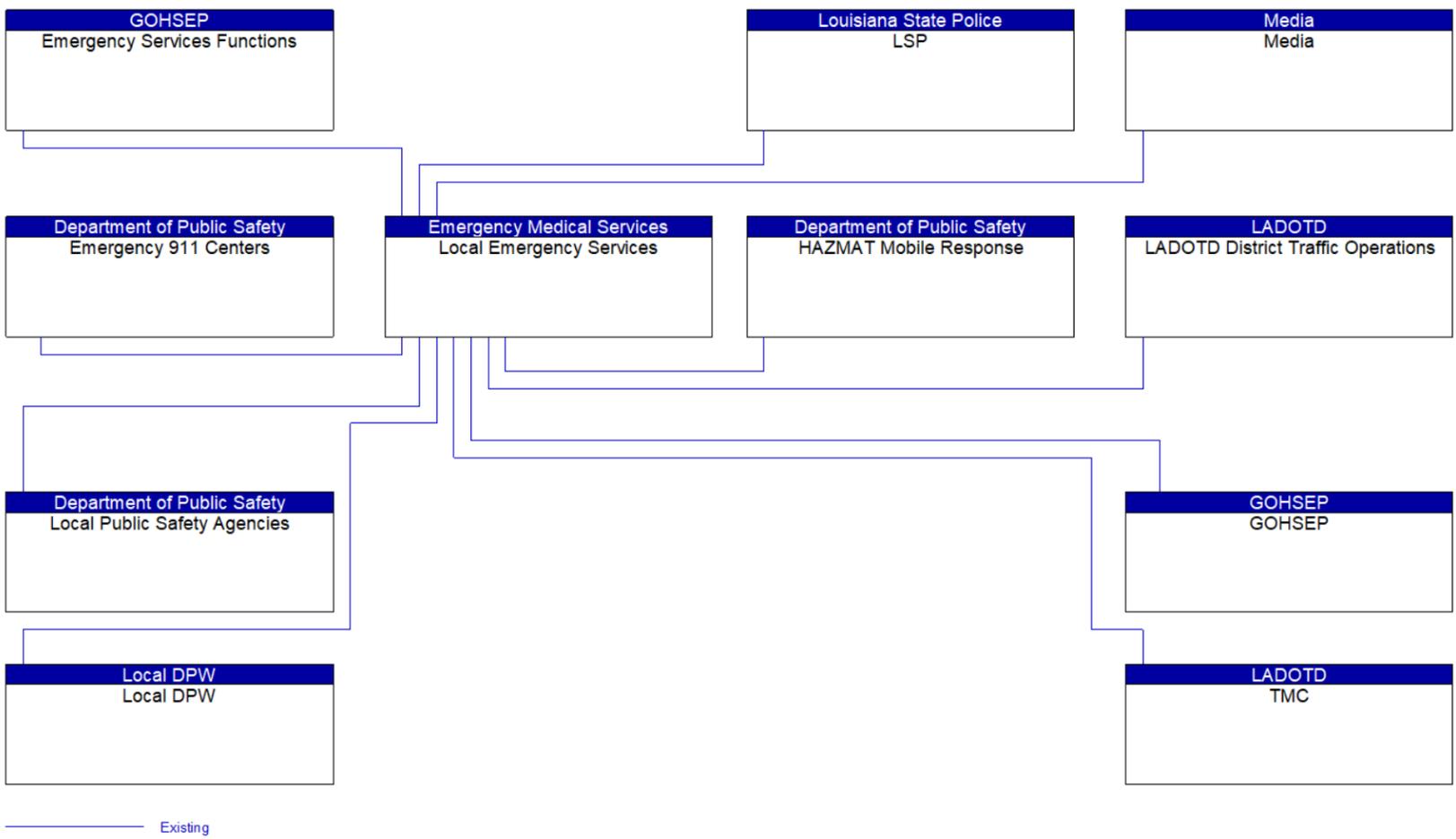


Figure 21: Local Emergency Services Context Diagram



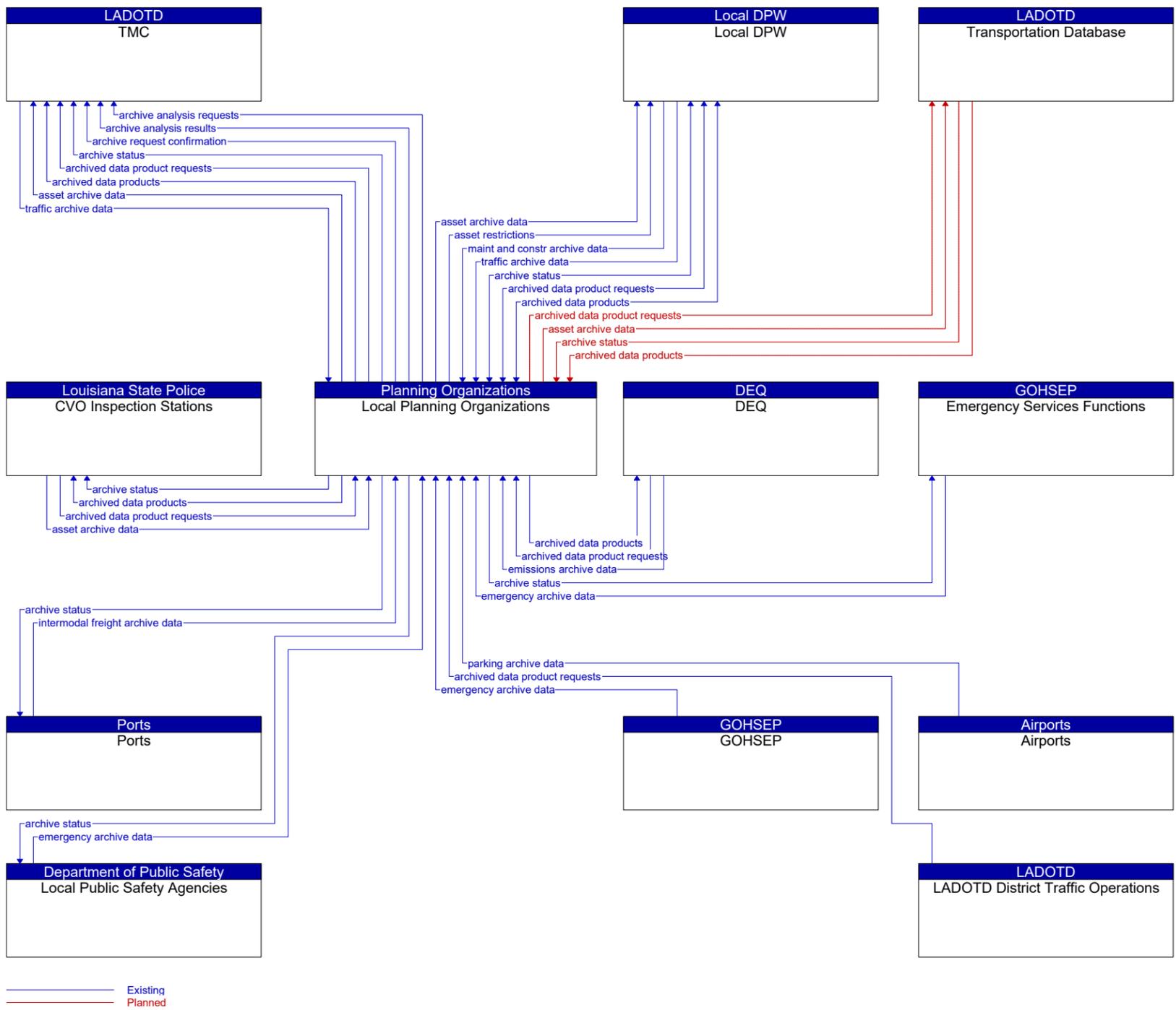


Figure 22: Local Planning Organizations Context Diagram

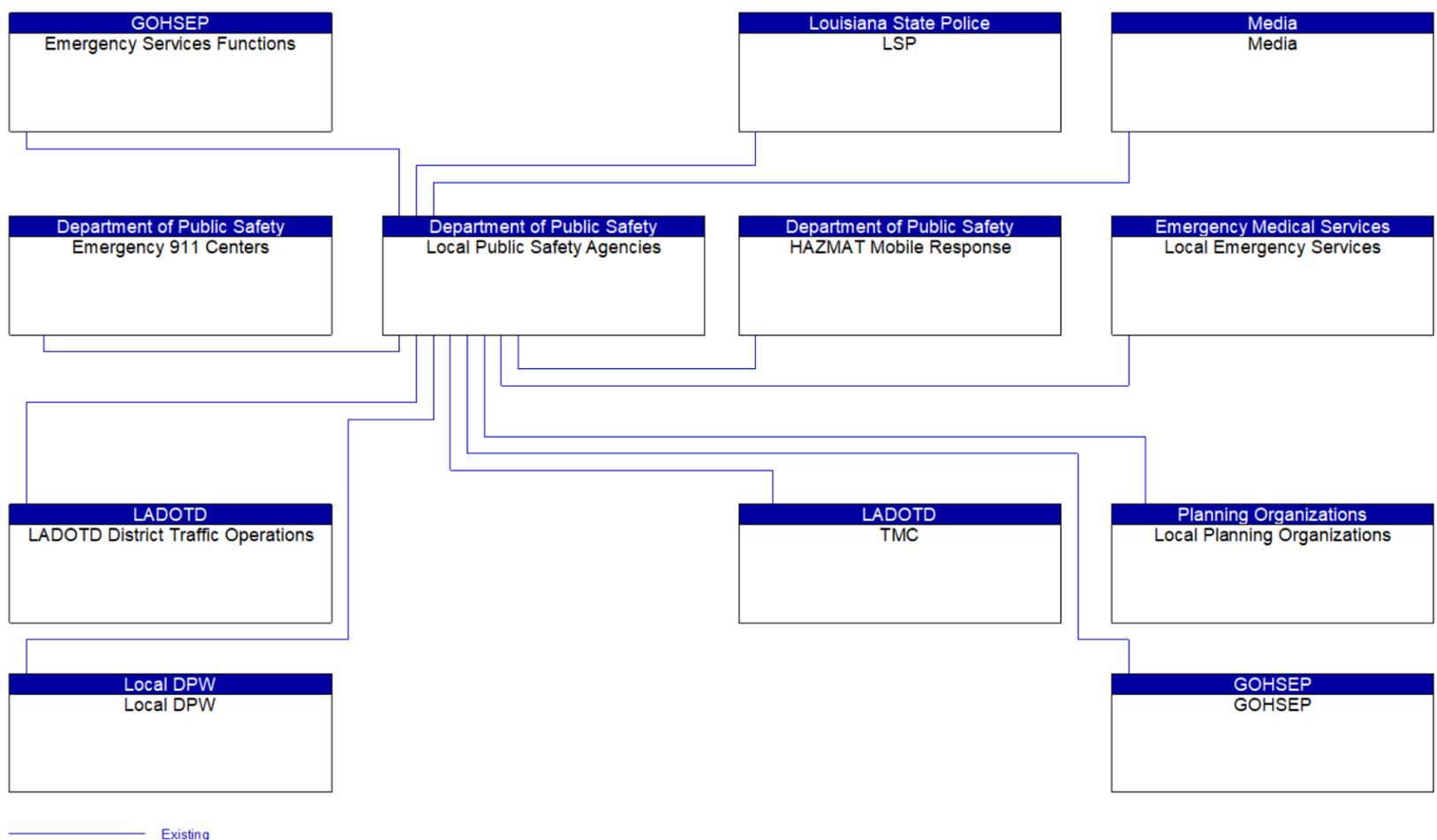


Figure 23: Local Public Safety Agencies Context Diagram



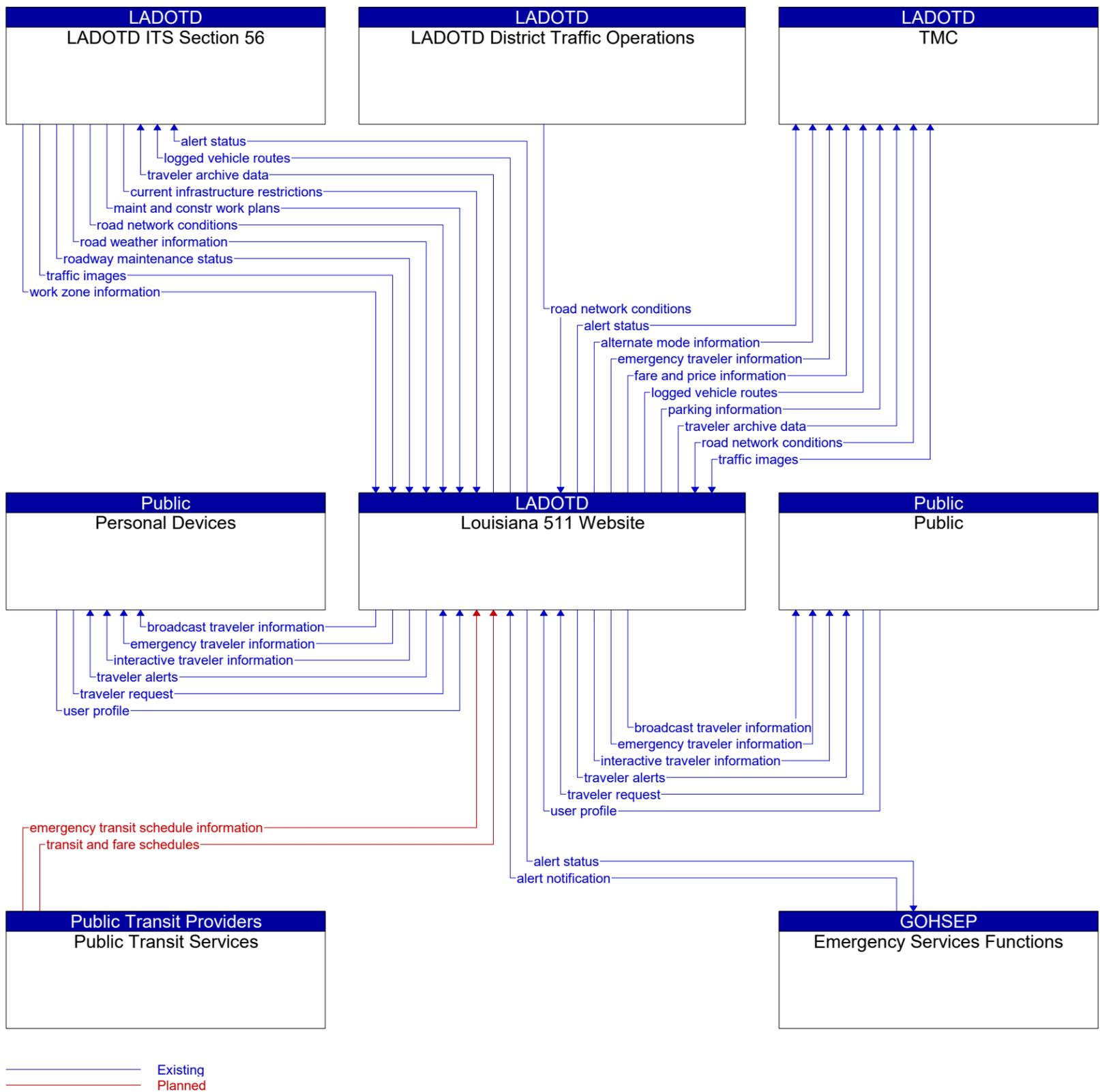


Figure 24: Louisiana 511 Website Context Diagram



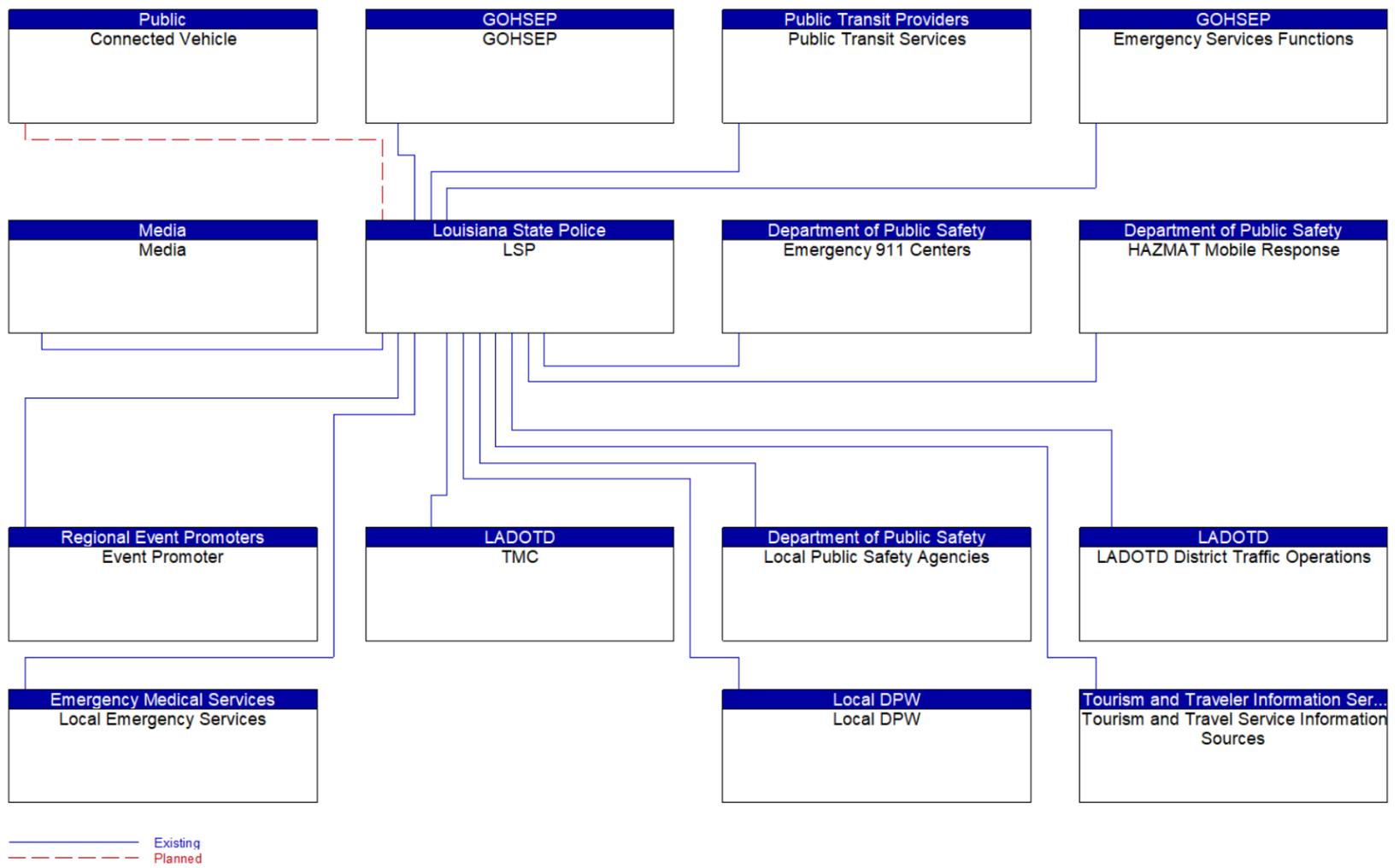


Figure 25: LSP Context Diagram



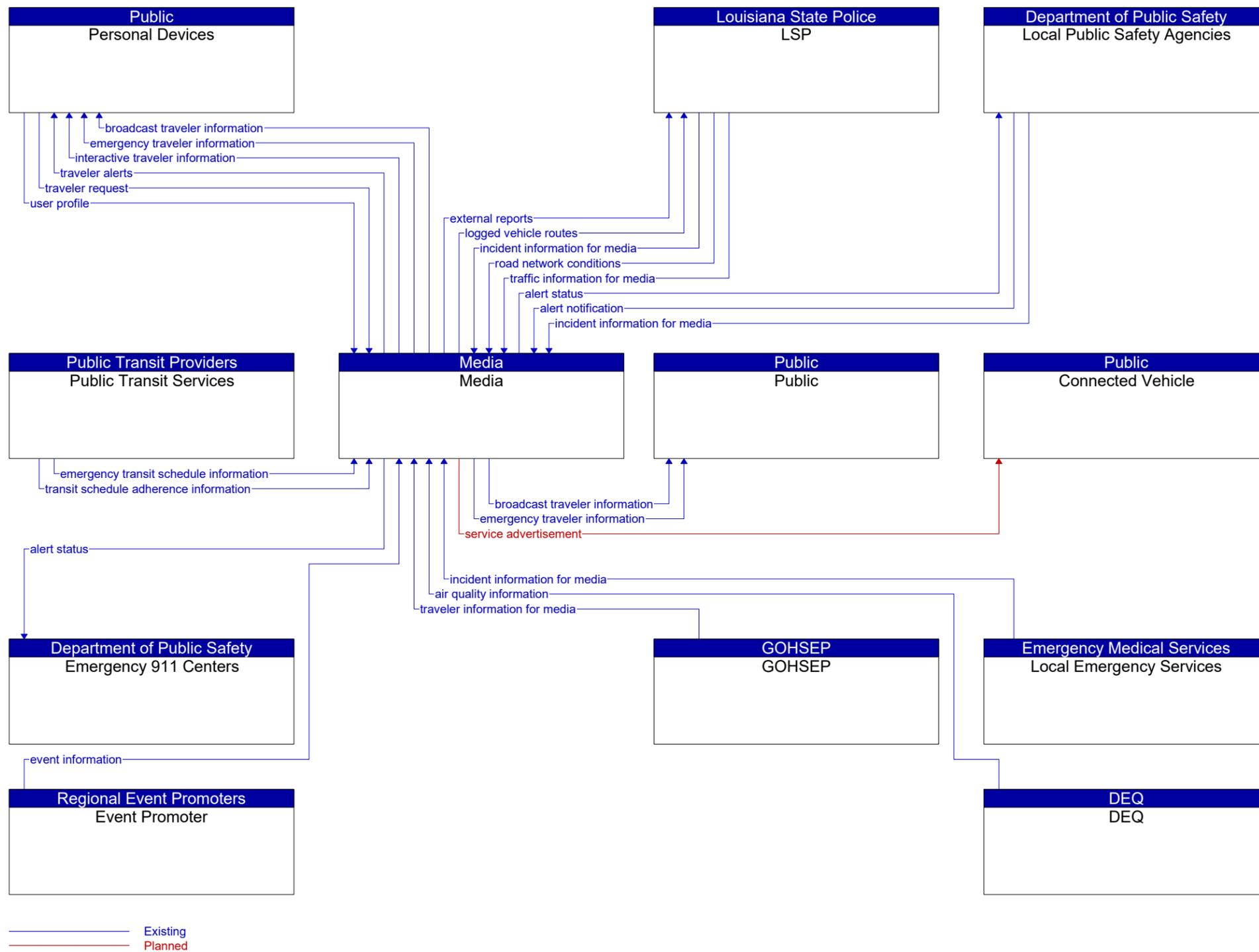


Figure 26: Media Context Diagram



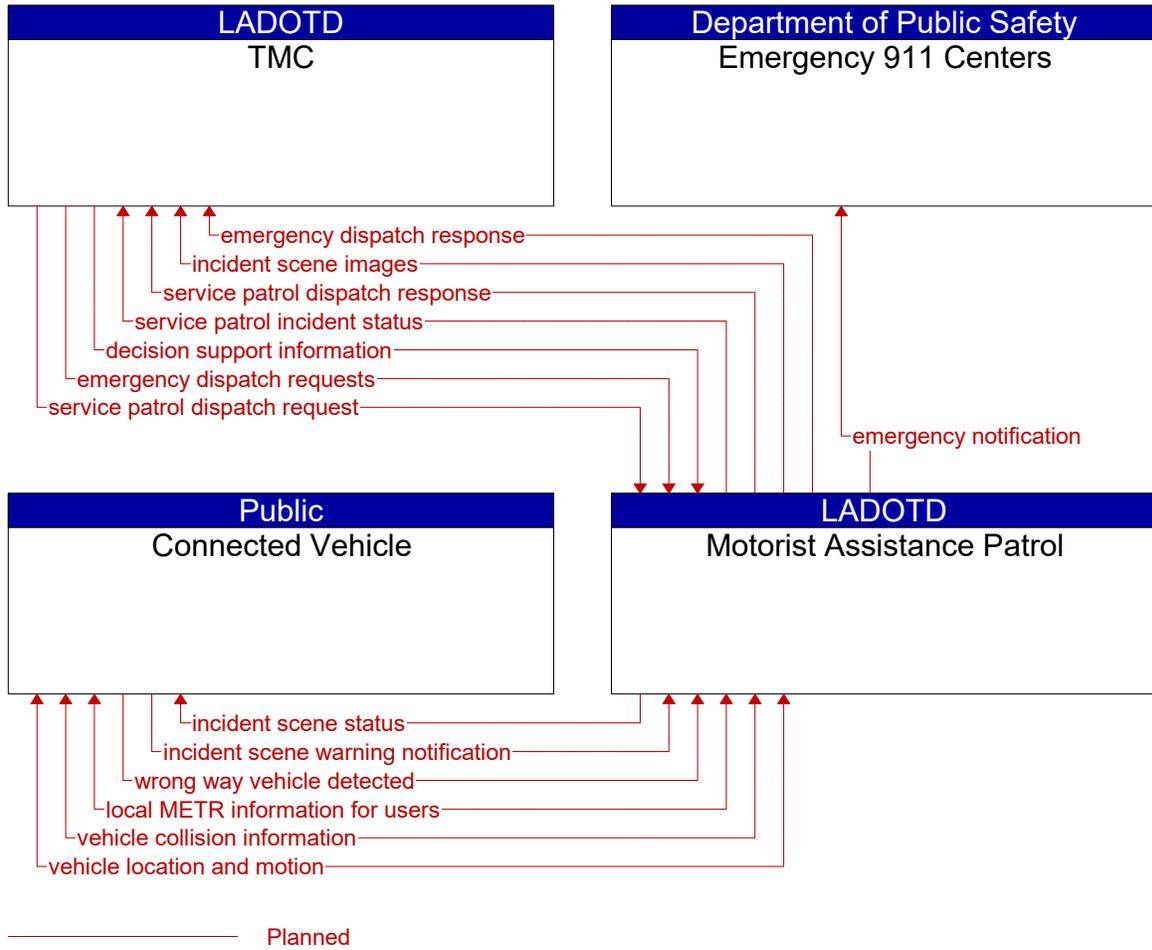


Figure 27: Motorist Assistance Patrol Context Diagram



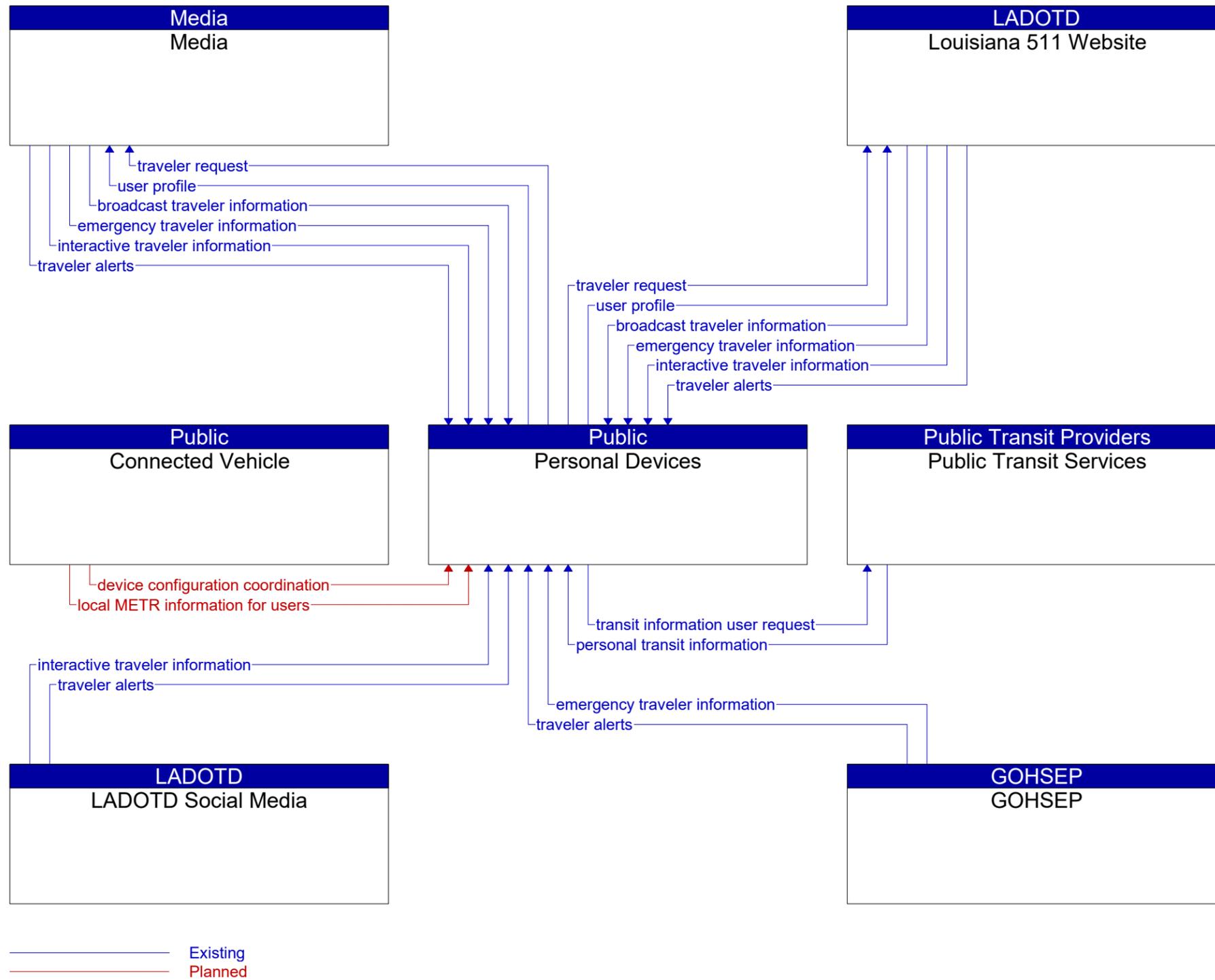


Figure 28: Personal Devices Context Diagram



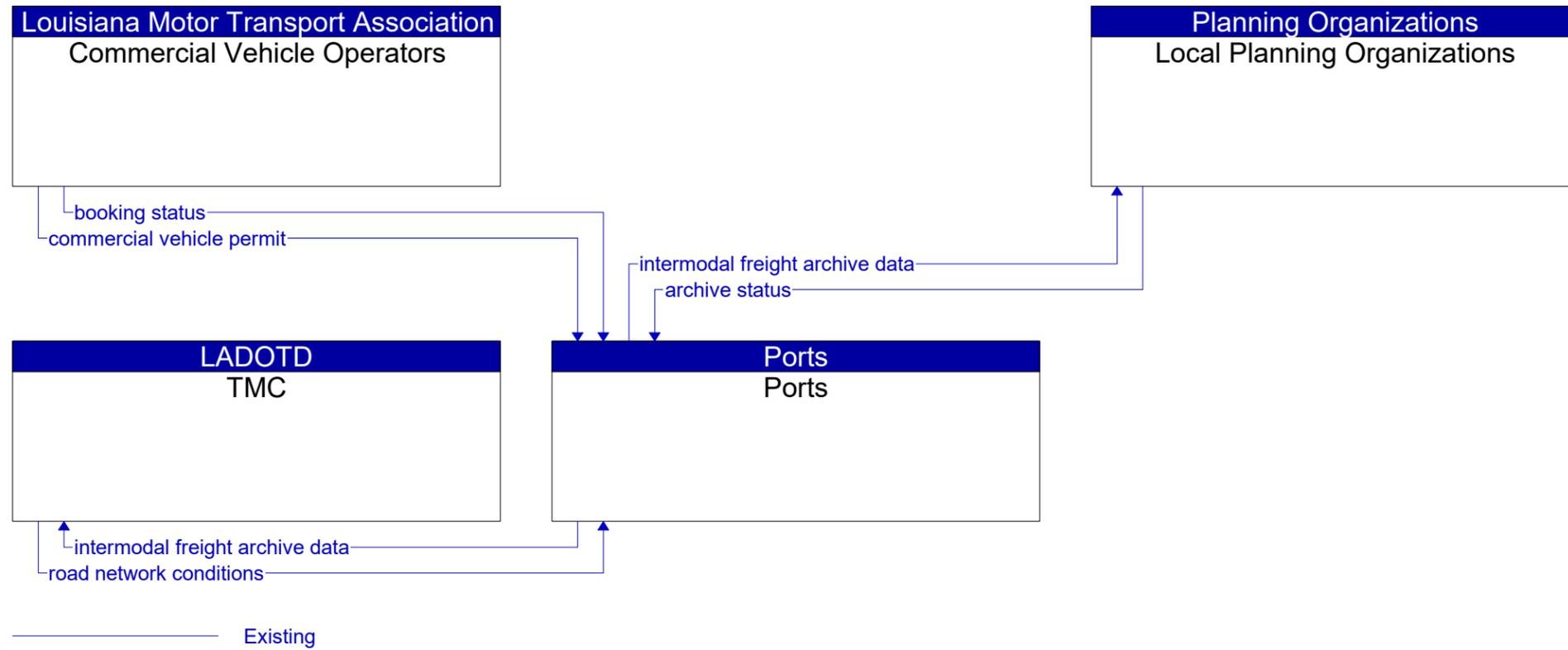


Figure 29: Ports Context Diagram



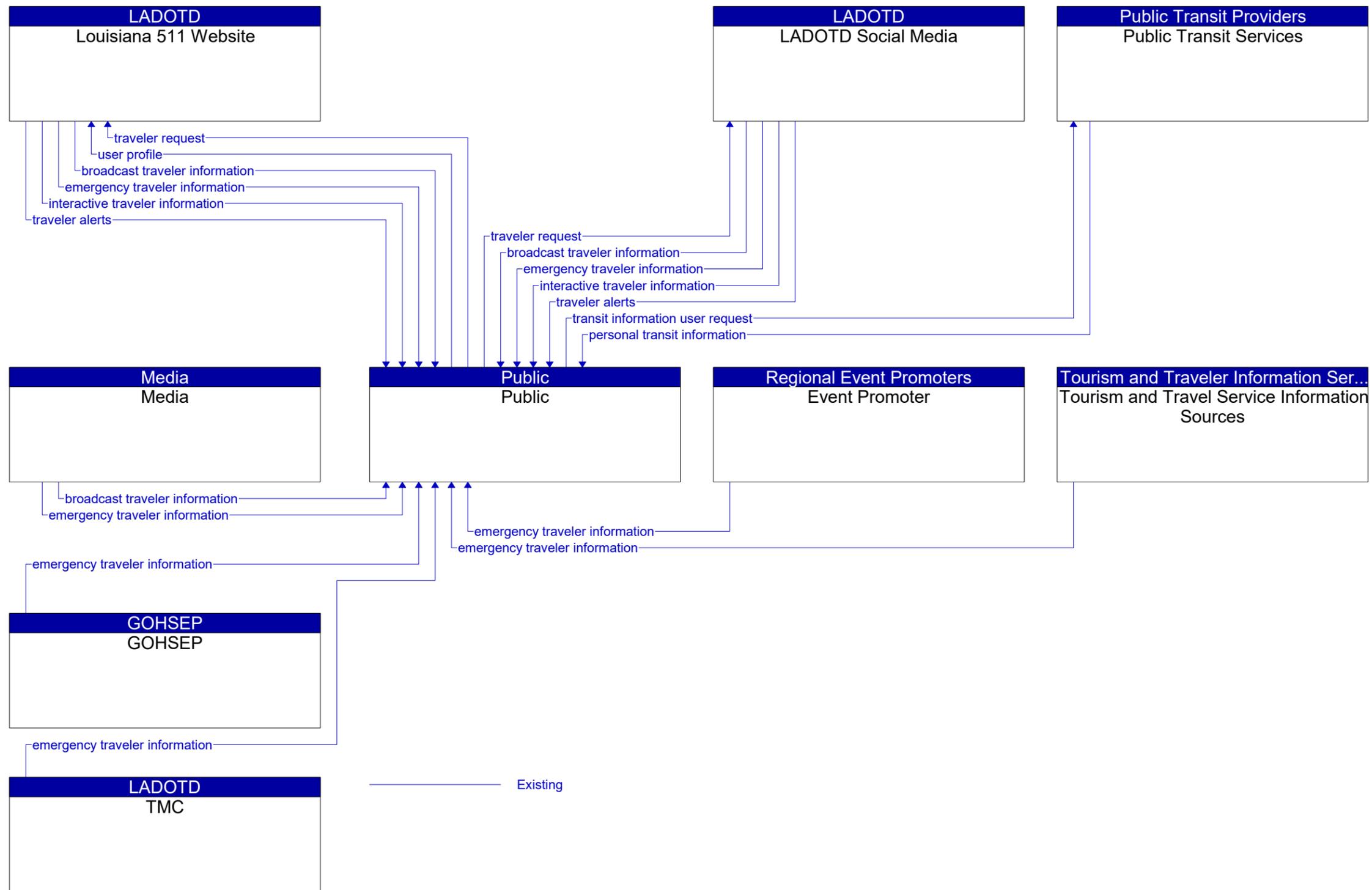


Figure 30: Public Context Diagram



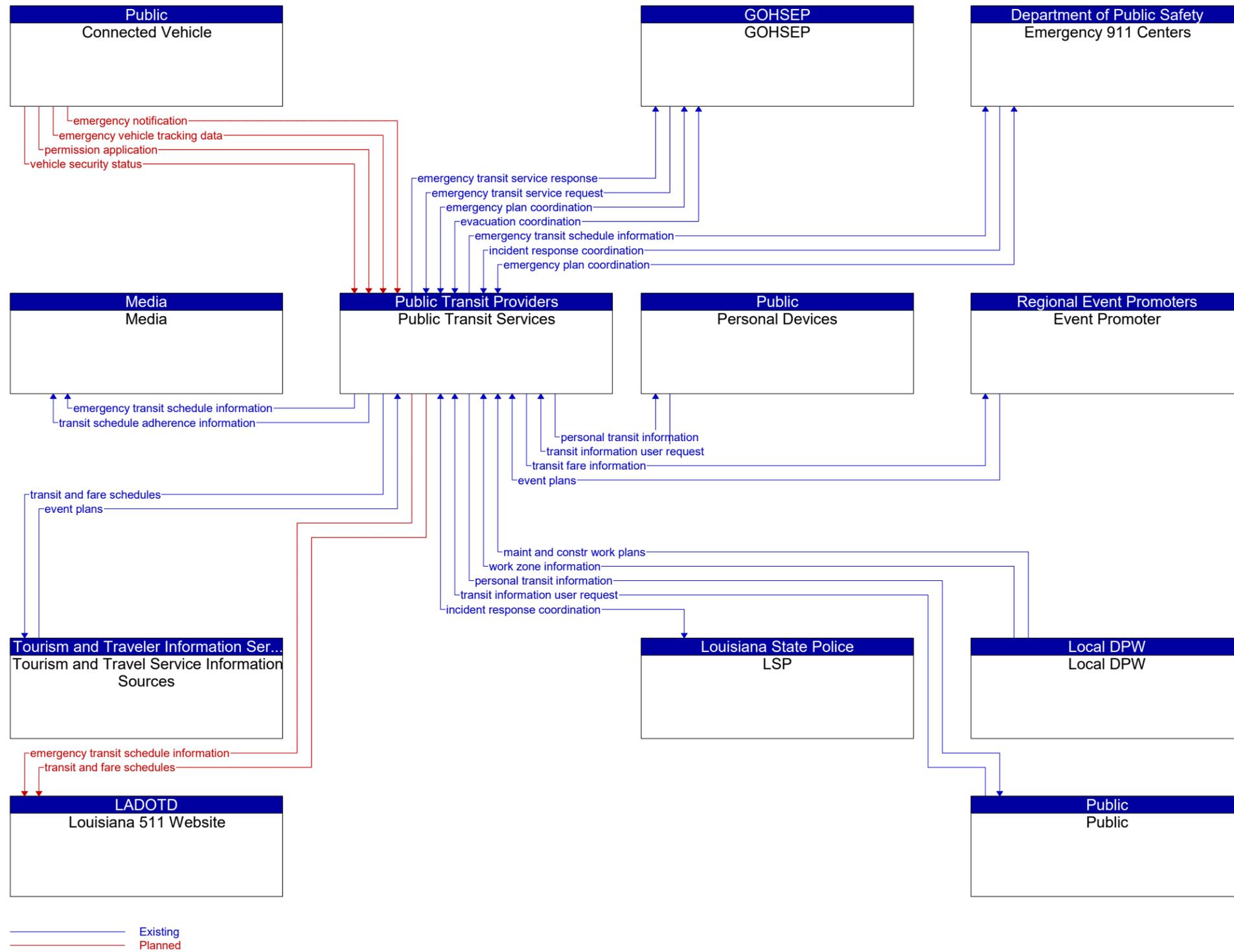


Figure 31: Public Transit Services Context Diagram



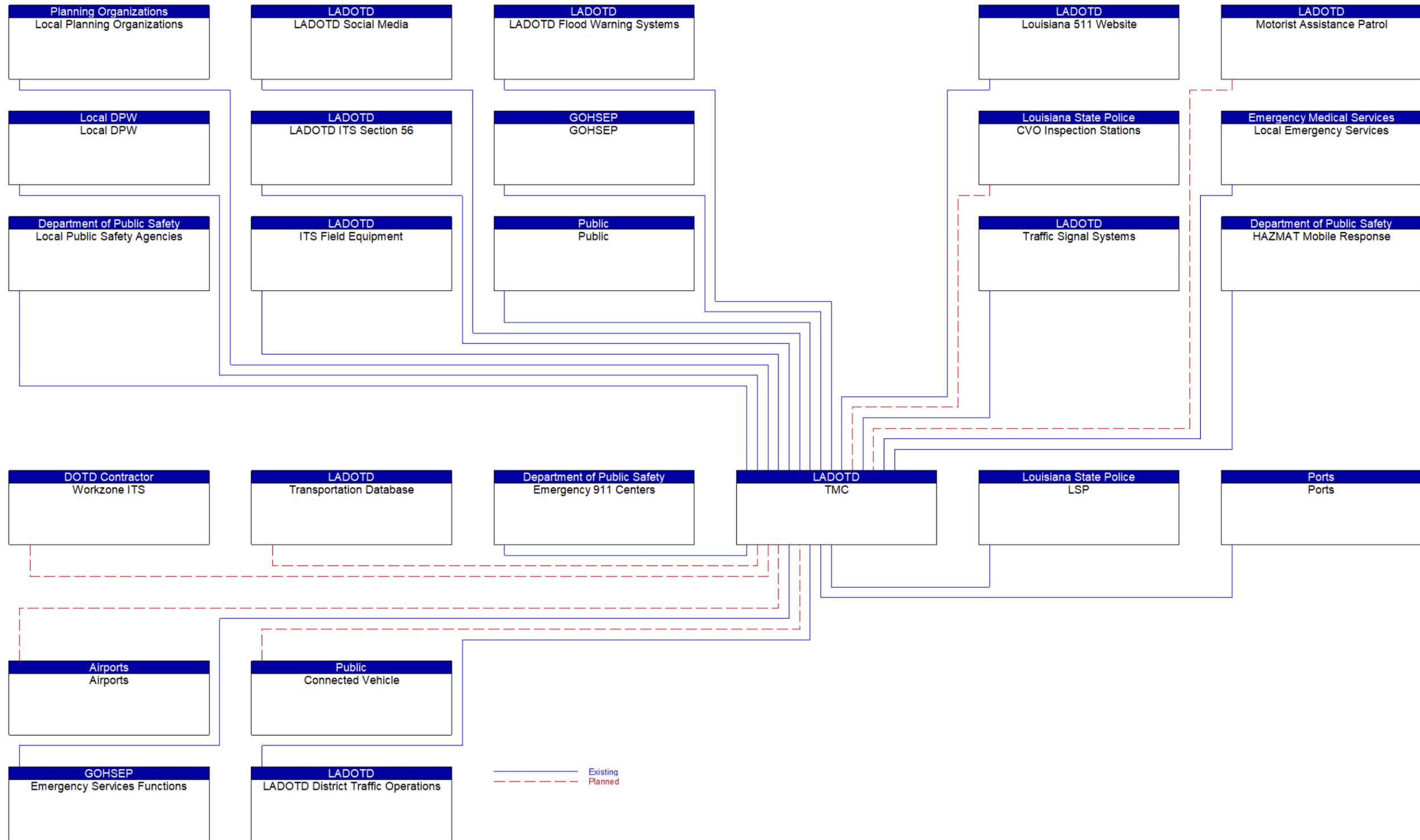


Figure 32: TMC Context Diagram



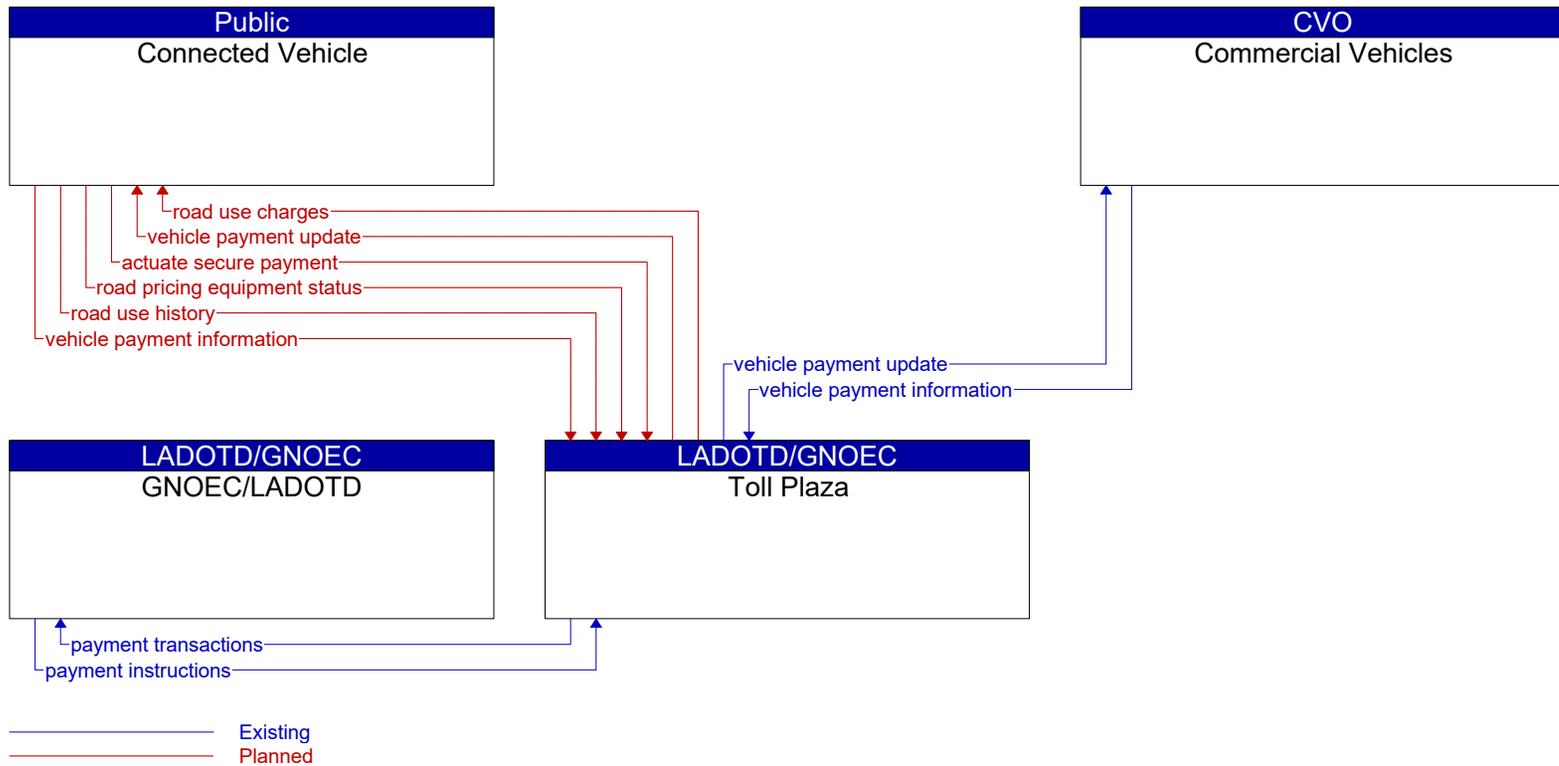


Figure 33: Toll Plaza Context Diagram



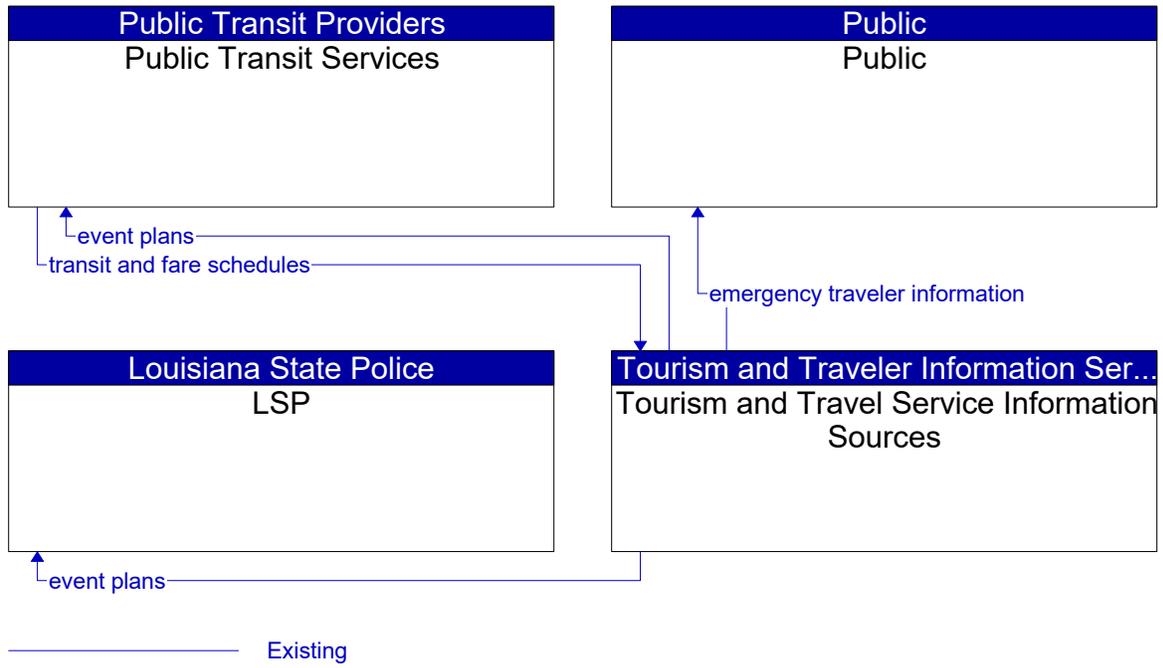


Figure 34: Tourism and Travel Service Information Sources Context Diagram



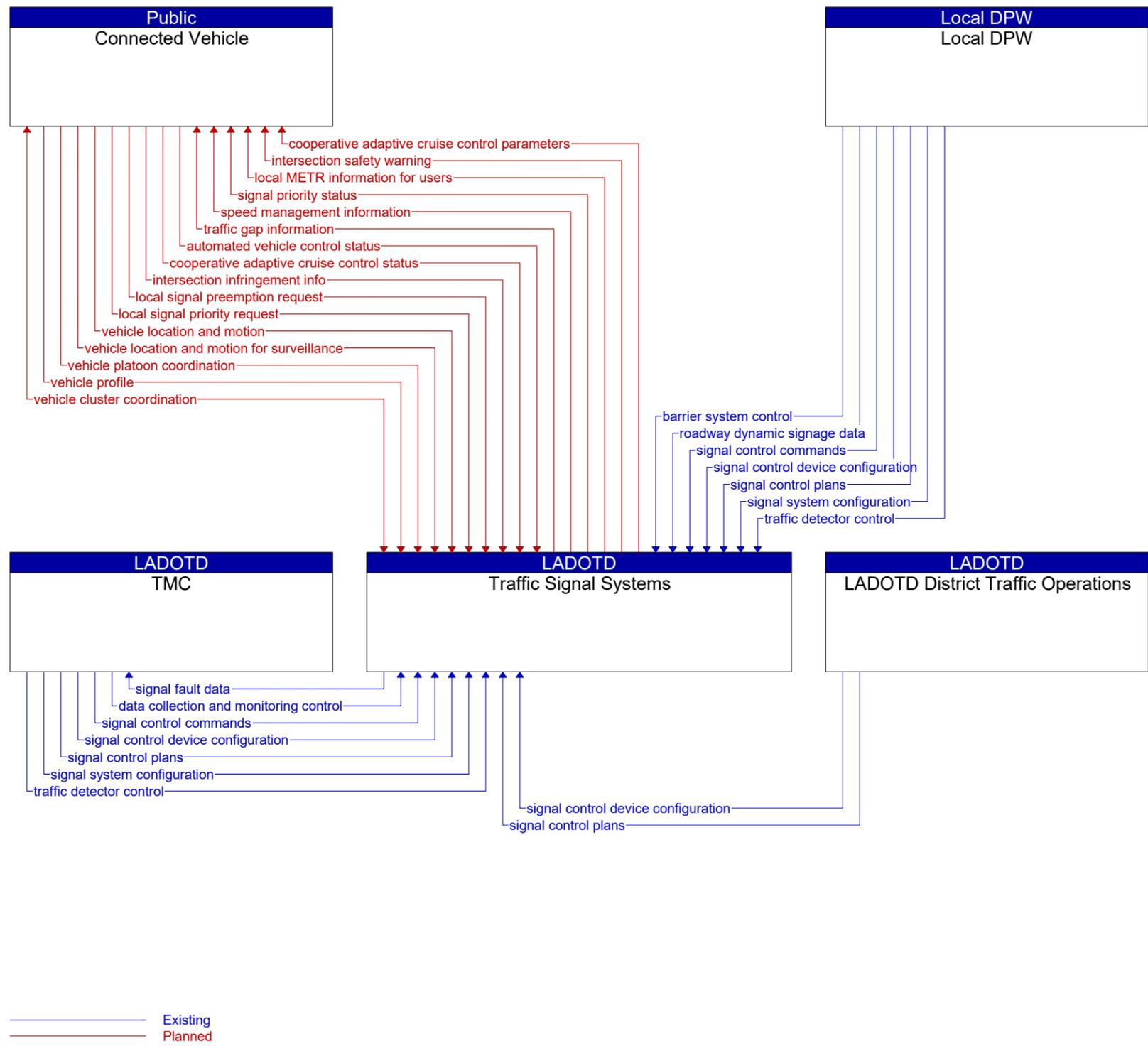
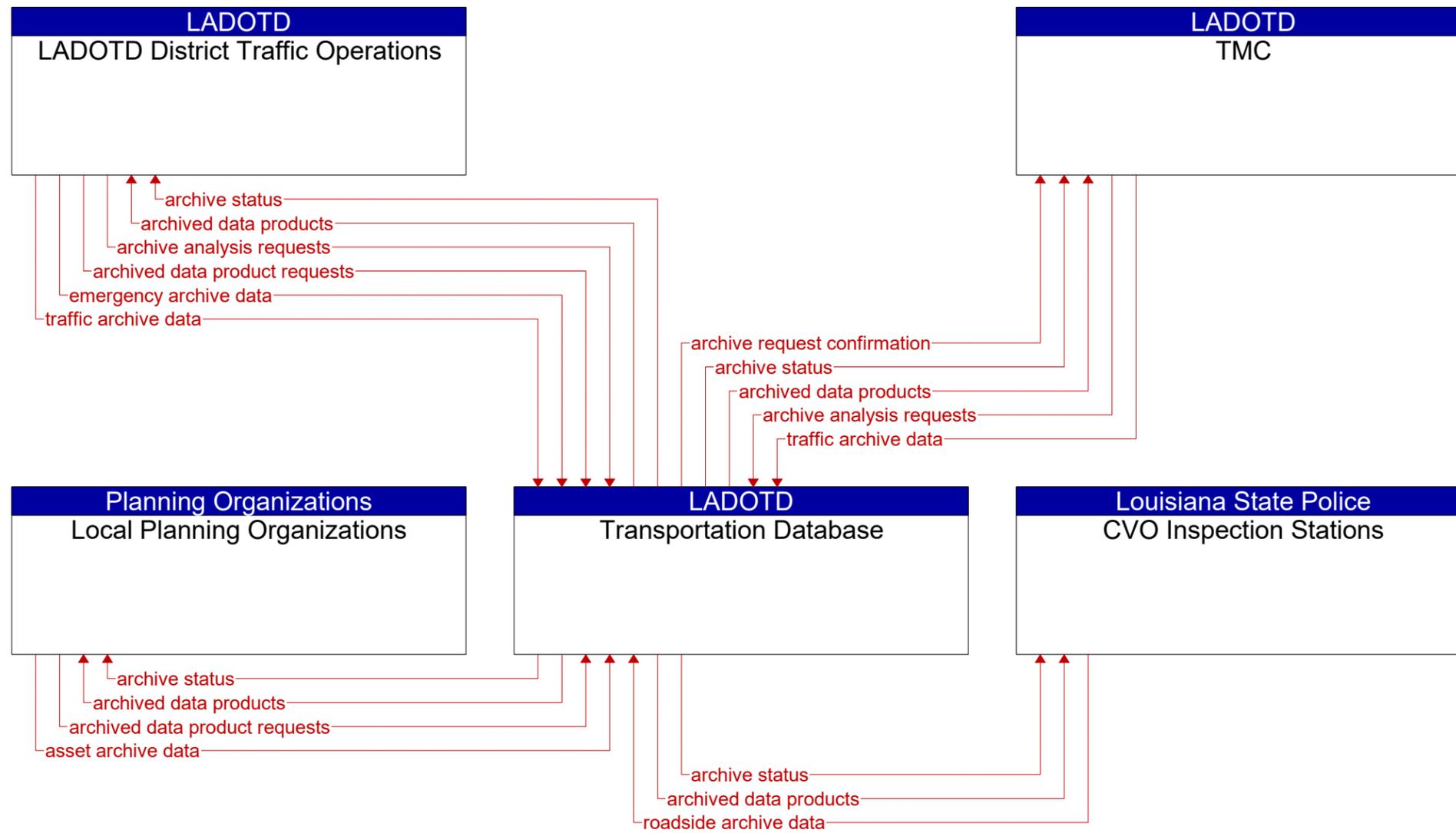


Figure 35: Traffic Signal Systems Context Diagram





Planned

Figure 36: Transportation Database Context Diagram



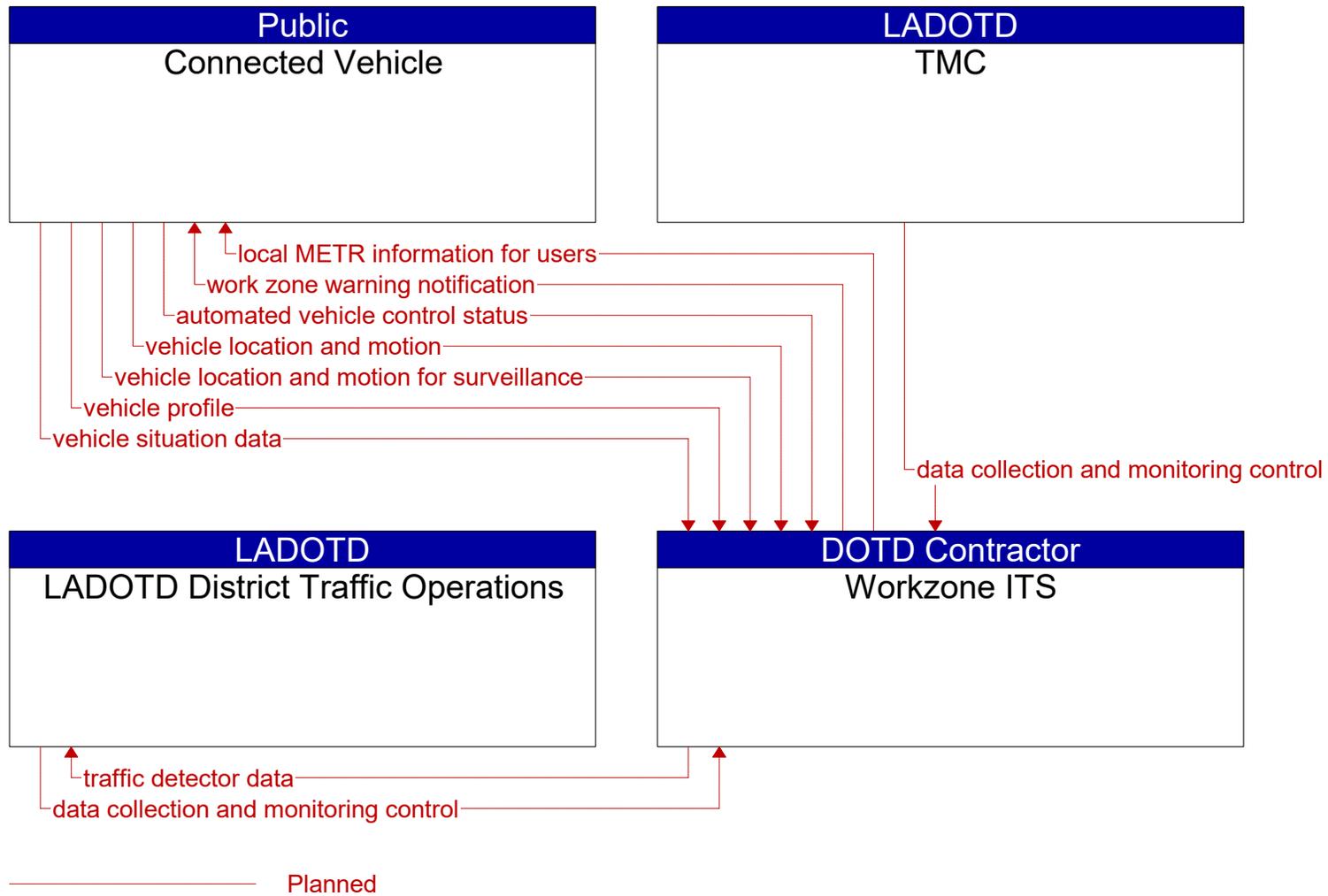


Figure 37: Workzone ITS Context Diagram



APPENDIX E COMMUNICATIONS SOLUTIONS

Guaranteed Secure Internet (ITS) Details

Solution Description: This solution is used within Australia, the E.U. and the U.S.. It combines standards associated with (None-Data) with those for I-I: Guaranteed Secure Internet (ITS). The (None-Data) standards include an unspecified set of standards at the upper layers. The I-I: Guaranteed Secure Internet (ITS) standards include lower-layer standards that support secure communications with guaranteed delivery between ITS equipment using X.509 or IEEE 1609.2 security certificates.

Guaranteed Secure Internet (ITS) Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.



Level	Document Number	Title	Description
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
ITS Application Entity		Standard(s) need to be developed	One or more standards need to be developed for this subject matter before this is considered a complete solution.
Facilities		Standard(s) need to be developed	One or more standards need to be developed for this subject matter before this is considered a complete solution.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access		Internet Subnet Alternatives	A set of alternative standards that includes any Subnet Layer method of connecting to the Internet.

Guaranteed Secure Internet (ITS) Interfaces

Source	Destination	Flow
Emergency 911 Centers	LADOTD District Traffic Operations	emergency plan coordination
Emergency 911 Centers	LSP	emergency plan coordination
Emergency 911 Centers	Public Transit Services	emergency plan coordination
Emergency 911 Centers	TMC	emergency plan coordination
Emergency Services Functions	LADOTD District Traffic Operations	emergency plan coordination
Emergency Services Functions	LADOTD ITS Section 56	emergency plan coordination
Emergency Services Functions	Louisiana 511 Website	alert notification
Emergency Services Functions	TMC	alert notification
Emergency Services Functions	TMC	emergency plan coordination
GOHSEP	LADOTD District Traffic Operations	emergency plan coordination
GOHSEP	LADOTD ITS Section 56	emergency plan coordination
GOHSEP	LSP	emergency plan coordination
GOHSEP	Public Transit Services	emergency plan coordination



Source	Destination	Flow
GOHSEP	TMC	emergency plan coordination
HAZMAT Mobile Response	LSP	emergency plan coordination
LADOTD District Traffic Operations	Emergency Services Functions	emergency plan coordination
LADOTD District Traffic Operations	Emergency Services Functions	road network status assessment
LADOTD District Traffic Operations	GOHSEP	emergency plan coordination
LADOTD District Traffic Operations	Local DPW	emergency plan coordination
LADOTD District Traffic Operations	Local Emergency Services	emergency plan coordination
LADOTD District Traffic Operations	Local Public Safety Agencies	emergency plan coordination
LADOTD District Traffic Operations	LSP	emergency plan coordination
LADOTD District Traffic Operations	TMC	emergency plan coordination
LADOTD ITS Section 56	Emergency Services Functions	emergency plan coordination
LADOTD ITS Section 56	GOHSEP	emergency plan coordination
LADOTD ITS Section 56	GOHSEP	road network status assessment
LADOTD ITS Section 56	LADOTD District Traffic Operations	emergency plan coordination
LADOTD ITS Section 56	TMC	alert status
LADOTD ITS Section 56	TMC	emergency plan coordination
LADOTD ITS Section 56	TMC	road network status assessment
Local DPW	GOHSEP	emergency plan coordination
Local DPW	GOHSEP	road network status assessment
Local DPW	HAZMAT Mobile Response	emergency plan coordination
Local DPW	LADOTD District Traffic Operations	emergency plan coordination
Local DPW	Local Emergency Services	emergency plan coordination
Local DPW	Local Emergency Services	road network status assessment
Local DPW	Local Public Safety Agencies	alert status
Local DPW	Local Public Safety Agencies	emergency plan coordination
Local DPW	TMC	alert status
Local DPW	TMC	emergency plan coordination
Local DPW	TMC	road network status assessment
Local Emergency Services	Local DPW	emergency plan coordination
Local Emergency Services	LSP	emergency plan coordination
Local Emergency Services	TMC	alert notification
Local Emergency Services	TMC	emergency plan coordination
Local Public Safety Agencies	LADOTD District Traffic Operations	emergency plan coordination
Local Public Safety Agencies	Local DPW	alert notification
Local Public Safety Agencies	Local DPW	emergency plan coordination
Local Public Safety Agencies	LSP	alert notification
Local Public Safety Agencies	LSP	emergency plan coordination
Local Public Safety Agencies	Media	alert notification
Local Public Safety Agencies	TMC	alert notification
Local Public Safety Agencies	TMC	emergency plan coordination
Louisiana 511 Website	Emergency Services Functions	alert status
Louisiana 511 Website	LADOTD ITS Section 56	alert status
Louisiana 511 Website	TMC	alert status
LSP	Emergency 911 Centers	alert status



Source	Destination	Flow
LSP	Emergency 911 Centers	emergency plan coordination
LSP	Emergency 911 Centers	road network status assessment
LSP	GOHSEP	emergency plan coordination
LSP	GOHSEP	road network status assessment
LSP	HAZMAT Mobile Response	emergency plan coordination
LSP	LADOTD District Traffic Operations	emergency plan coordination
LSP	Local Emergency Services	emergency plan coordination
LSP	Local Emergency Services	road network status assessment
LSP	Local Public Safety Agencies	alert status
LSP	Local Public Safety Agencies	emergency plan coordination
LSP	TMC	alert notification
LSP	TMC	alert status
LSP	TMC	emergency plan coordination
LSP	TMC	road network status assessment
Media	Emergency 911 Centers	alert status
Media	Local Public Safety Agencies	alert status
Public Transit Services	Emergency 911 Centers	emergency plan coordination
Public Transit Services	GOHSEP	emergency plan coordination
TMC	Emergency 911 Centers	emergency plan coordination
TMC	Emergency 911 Centers	road network status assessment
TMC	Emergency Services Functions	alert status
TMC	Emergency Services Functions	emergency plan coordination
TMC	Emergency Services Functions	road network status assessment
TMC	GOHSEP	emergency plan coordination
TMC	GOHSEP	road network status assessment
TMC	LADOTD District Traffic Operations	emergency plan coordination
TMC	LADOTD ITS Section 56	emergency plan coordination
TMC	LADOTD ITS Section 56	road network status assessment
TMC	Local DPW	emergency plan coordination
TMC	Local DPW	road network status assessment
TMC	Local Emergency Services	emergency plan coordination
TMC	Local Emergency Services	road network status assessment
TMC	Local Public Safety Agencies	emergency plan coordination
TMC	Local Public Safety Agencies	road network status assessment
TMC	LSP	emergency plan coordination
TMC	LSP	road network status assessment

Secure Internet (ITS) Details

Solution Description: This solution is used within Australia, the E.U. and the U.S.. It combines standards associated with (None-Data) with those for I-I: Secure Internet (ITS). The (None-Data) standards include an unspecified set of standards at the upper layers. The I-I: Secure Internet (ITS) standards include lower-layer standards that support secure communications between ITS equipment using X.509 or IEEE 1609.2 security certificates.



Secure Internet (ITS) Standards

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Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
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Level	Document Number	Title	Description
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Access		Internet Subnet Alternatives	A set of alternative standards that includes any Subnet Layer method of connecting to the Internet.

Secure Internet (ITS) Interfaces

Source	Destination	Flow
Commercial Vehicle Operators	CVO Inspection Stations	carrier participation report
Commercial Vehicle Operators	CVO Inspection Stations	credentials information
Commercial Vehicle Operators	CVO Inspection Stations	credentials status information
Commercial Vehicle Operators	CVO Inspection Stations	cv driver record
Commercial Vehicle Operators	Ports	booking status
Commercial Vehicle Operators	Ports	commercial vehicle permit
Emergency 911 Centers	LSP	resource deployment status
Emergency Services Functions	GOHSEP	transportation system status
Emergency Services Functions	LADOTD District Traffic Operations	evacuation information
Emergency Services Functions	LADOTD District Traffic Operations	incident response status
Emergency Services Functions	LADOTD District Traffic Operations	resource deployment status
Emergency Services Functions	LADOTD District Traffic Operations	resource request
Emergency Services Functions	LADOTD District Traffic Operations	transportation system status
Emergency Services Functions	LADOTD ITS Section 56	evacuation information
Emergency Services Functions	LADOTD ITS Section 56	maint and constr resource request
Emergency Services Functions	Local DPW	work plan feedback
Emergency Services Functions	LSP	incident response status
Emergency Services Functions	LSP	resource deployment status
Emergency Services Functions	LSP	resource request
Emergency Services Functions	TMC	evacuation information
Emergency Services Functions	TMC	incident response status
Emergency Services Functions	TMC	resource deployment status
Emergency Services Functions	TMC	resource request
Emergency Services Functions	TMC	transportation system status
Event Promoter	LSP	event plans



Source	Destination	Flow
Event Promoter	Media	event information
Event Promoter	Public Transit Services	event plans
GNOEC/LADOTD	Toll Plaza	payment instructions
GOHSEP	Local DPW	resource request
ITS Field Equipment	LADOTD ITS Section 56	infrastructure monitoring sensor data
LADOTD District Traffic Operations	Emergency Services Functions	incident response status
LADOTD District Traffic Operations	Emergency Services Functions	resource deployment status
LADOTD District Traffic Operations	Emergency Services Functions	resource request
LADOTD District Traffic Operations	GOHSEP	transportation system status
LADOTD District Traffic Operations	LADOTD ITS Section 56	maintenance and repair needs
LADOTD District Traffic Operations	Local DPW	asset restrictions
LADOTD District Traffic Operations	LSP	evacuation information
LADOTD District Traffic Operations	TMC	evacuation information
LADOTD District Traffic Operations	TMC	resource request
LADOTD District Traffic Operations	TMC	transportation system status
LADOTD ITS Section 56	Emergency Services Functions	maint and constr resource response
LADOTD ITS Section 56	GOHSEP	resource deployment status
LADOTD ITS Section 56	GOHSEP	transportation system status
LADOTD ITS Section 56	ITS Field Equipment	infrastructure monitoring sensor control
LADOTD ITS Section 56	LADOTD Social Media	roadway maintenance status
LADOTD ITS Section 56	Louisiana 511 Website	roadway maintenance status
LADOTD ITS Section 56	TMC	archive request confirmation
LADOTD ITS Section 56	TMC	evacuation information
LADOTD ITS Section 56	TMC	incident response status
LADOTD ITS Section 56	TMC	maint and constr resource response
LADOTD ITS Section 56	TMC	resource deployment status
LADOTD ITS Section 56	TMC	resource request
LADOTD ITS Section 56	TMC	roadway maintenance status
LADOTD ITS Section 56	TMC	transportation system status
Local DPW	GOHSEP	resource deployment status
Local DPW	Local Emergency Services	incident response status
Local DPW	Local Emergency Services	maint and constr resource response
Local DPW	Local Emergency Services	resource deployment status
Local DPW	Local Emergency Services	resource request
Local DPW	Local Public Safety Agencies	incident response status
Local DPW	Local Public Safety Agencies	maint and constr resource response
Local DPW	Local Public Safety Agencies	resource deployment status
Local DPW	Local Public Safety Agencies	resource request
Local DPW	LSP	incident response status
Local DPW	LSP	maint and constr resource response
Local DPW	LSP	resource deployment status
Local DPW	LSP	resource request
Local DPW	TMC	archive request confirmation
Local DPW	TMC	asset status update



Source	Destination	Flow
Local DPW	TMC	incident response status
Local DPW	TMC	maint and constr resource response
Local DPW	TMC	resource deployment status
Local DPW	TMC	resource request
Local DPW	TMC	roadway maintenance status
Local DPW	Traffic Signal Systems	barrier system control
Local Emergency Services	Local DPW	evacuation information
Local Emergency Services	Local DPW	incident response status
Local Emergency Services	Local DPW	maint and constr resource request
Local Emergency Services	Local DPW	resource deployment status
Local Emergency Services	Local DPW	resource request
Local Emergency Services	Local DPW	transportation system status
Local Emergency Services	Local DPW	work plan feedback
Local Emergency Services	LSP	evacuation information
Local Emergency Services	LSP	resource deployment status
Local Emergency Services	LSP	resource request
Local Emergency Services	LSP	transportation system status
Local Emergency Services	TMC	evacuation information
Local Emergency Services	TMC	incident response status
Local Emergency Services	TMC	resource deployment status
Local Emergency Services	TMC	resource request
Local Emergency Services	TMC	transportation system status
Local Planning Organizations	Local DPW	asset restrictions
Local Planning Organizations	TMC	archive request confirmation
Local Public Safety Agencies	Local DPW	evacuation information
Local Public Safety Agencies	Local DPW	incident response status
Local Public Safety Agencies	Local DPW	maint and constr resource request
Local Public Safety Agencies	Local DPW	resource deployment status
Local Public Safety Agencies	Local DPW	resource request
Local Public Safety Agencies	Local DPW	work plan feedback
Local Public Safety Agencies	LSP	evacuation information
Local Public Safety Agencies	LSP	incident response status
Local Public Safety Agencies	LSP	resource deployment status
Local Public Safety Agencies	LSP	resource request
Local Public Safety Agencies	TMC	evacuation information
Local Public Safety Agencies	TMC	incident response status
Local Public Safety Agencies	TMC	resource deployment status
Local Public Safety Agencies	TMC	resource request
Local Public Safety Agencies	TMC	transportation system status
Louisiana 511 Website	LADOTD ITS Section 56	logged vehicle routes
Louisiana 511 Website	TMC	logged vehicle routes
LSP	Emergency 911 Centers	incident response status
LSP	Emergency 911 Centers	resource deployment status
LSP	Emergency 911 Centers	resource request



Source	Destination	Flow
LSP	Emergency Services Functions	incident response status
LSP	Emergency Services Functions	resource deployment status
LSP	Emergency Services Functions	resource request
LSP	Event Promoter	event confirmation
LSP	GOHSEP	resource deployment status
LSP	GOHSEP	transportation system status
LSP	HAZMAT Mobile Response	resource request
LSP	Local DPW	incident response status
LSP	Local DPW	maint and constr resource request
LSP	Local DPW	resource deployment status
LSP	Local DPW	resource request
LSP	Local DPW	work plan feedback
LSP	Local Emergency Services	incident response status
LSP	Local Emergency Services	resource deployment status
LSP	Local Emergency Services	resource request
LSP	Local Public Safety Agencies	incident response status
LSP	Local Public Safety Agencies	resource deployment status
LSP	Local Public Safety Agencies	resource request
LSP	TMC	evacuation information
LSP	TMC	incident response status
LSP	TMC	resource deployment status
LSP	TMC	resource request
LSP	TMC	transportation system status
Media	LSP	external reports
Media	LSP	logged vehicle routes
TMC	Emergency Services Functions	incident response status
TMC	Emergency Services Functions	resource deployment status
TMC	Emergency Services Functions	resource request
TMC	GOHSEP	transportation system status
TMC	LADOTD ITS Section 56	asset restrictions
TMC	LADOTD ITS Section 56	evacuation information
TMC	LADOTD ITS Section 56	transportation system status
TMC	Local DPW	evacuation information
TMC	Local DPW	transportation system status
TMC	Local DPW	work plan feedback
TMC	LSP	evacuation information
TMC	LSP	transportation system status
Toll Plaza	GNOEC/LADOTD	payment transactions
Tourism and Travel Service Information Sources	LSP	event plans
Tourism and Travel Service Information Sources	Public Transit Services	event plans
Transportation Database	TMC	archive request confirmation

Secure Wireless Internet (ITS) Details



Solution Description: This solution is used within the U.S.. It combines standards associated with (None-Data) with those for I-M: Secure Wireless Internet (ITS). The (None-Data) standards include an unspecified set of standards at the upper layers. The I-M: Secure Wireless Internet (ITS) standards include lower-layer standards that support secure communications between two entities, either or both of which may be mobile devices, but they must be stationary or only moving within wireless range of a single wireless access point (e.g., a parked car). Security is based on X.509 or IEEE 1609.2 certificates. A non-mobile (if any) endpoint may connect to the service provider using any Internet connection method.

Secure Wireless Internet (ITS) Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.



Level	Document Number	Title	Description
ITS Application Entity		Standard(s) need to be developed	One or more standards need to be developed for this subject matter before this is considered a complete solution.
Facilities		Standard(s) need to be developed	One or more standards need to be developed for this subject matter before this is considered a complete solution.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access	3GPP Network	3GPP Cellular Communications Network	This proxy standard represents a variety of 3GPP releases and underlying standards and technologies that rely upon cellular base stations for connectivity, including 3G, 4G, and the evolving 5G technologies.

Secure Wireless Internet (ITS) Interfaces

Source	Destination	Flow
Commercial Vehicles	Commercial Vehicle Operators	freight equipment information
Personal Devices	Louisiana 511 Website	user profile
Personal Devices	Media	user profile
Personal Devices	Public Transit Services	transit information user request
Public	Louisiana 511 Website	user profile
Public	Public Transit Services	transit information user request

Wide Area Broadcast Details

Solution Description: This solution is used within Australia, the E.U. and the U.S.. It combines standards associated with (None-Data) with those for C-X: Wide Area Broadcast. The (None-Data) standards include an unspecified set of standards at the upper layers. The C-X: Wide Area Broadcast standards include lower-layer standards that support one entity broadcasting information to all wireless devices over an area that covers at least a metropolitan area without any expectation of acknowledgement or response; security is provided by the upper-layers.



Wide Area Broadcast Standards

Level	Document Number	Title	Description
Mgmt		Proprietary	A proprietary mechanism to provide services for this layer.
Security		Proprietary	A proprietary mechanism to provide services for this layer.
ITS Application Entity		Standard(s) need to be developed	One or more standards need to be developed for this subject matter before this is considered a complete solution.
Facilities		Standard(s) need to be developed	One or more standards need to be developed for this subject matter before this is considered a complete solution.
TransNet		Proprietary	A proprietary mechanism to provide services for this layer.
Access		Satellite Broadcast Alternatives	A set of alternative standards that includes all satellite-based wireless broadcast technologies.

Wide Area Broadcast Interfaces

Source	Destination	Flow
Event Promoter	Public	emergency traveler information
GOHSEP	Personal Devices	emergency traveler information
GOHSEP	Public	emergency traveler information
LADOTD Social Media	Public	emergency traveler information
Louisiana 511 Website	Personal Devices	emergency traveler information
Louisiana 511 Website	Public	emergency traveler information
Media	Personal Devices	emergency traveler information
Media	Public	emergency traveler information
TMC	Public	emergency traveler information
Tourism and Travel Service Information Sources	Public	emergency traveler information

TPEG2 - Wide Area Broadcast Details

Solution Description: This solution is used within Australia, the E.U. and the U.S.. It combines standards associated with TPEG2 with those for C-X: Wide Area Broadcast. The TPEG2 standards include upper-layer standards required to support multi-modal information services.. The C-X: Wide Area Broadcast standards include lower-layer standards that support one entity broadcasting information to all wireless devices over an area that covers at least a metropolitan area without any expectation of acknowledgement or response; security is provided by the upper-layers.

TPEG2 - Wide Area Broadcast Standards

Level	Document Number	Title	Description
Mgmt		Proprietary	A proprietary mechanism to provide services for this layer.



Level	Document Number	Title	Description
Mgmt	ISO 21219-6	Intelligent transport systems - Traffic and travel information via transport protocol experts group, generation 2(TPEG2) -- Part 6: Message management container (TPEG2-MMC)	ISO 21219-6 adds a basic toolkit definition to the ISO 21219 series specifying the Message Management Container (MMC), which is used by all TPEG applications to provide information about the handling of messages on the TPEG client side. The MMC holds administrative information allowing a decoder to handle the message appropriately. This information is not aimed at the end user. The MMC is a toolkit and not a stand-alone application but is included in TPEG applications.
Security		Proprietary	A proprietary mechanism to provide services for this layer.
Security	ISO 21219-24	Intelligent transport systems - Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) -- Part 24: Light encryption (TPEG2-LTE)	ISO/TS 21219-24 defines the LTE encryption mechanism for TPEG Service Data Frames. It has been specifically designed for use with Business-to-Business (B2B) business models. The objective of this document is to provide a simple to use, yet effective Conditional Access mechanism for TPEG including encryption for use with both broadcast and/or point-to-point delivery. For both service providers and device manufacturers, a standardized conditional access mechanism is beneficial to avoid a proliferation of proprietary methods with multiplied implementation effort and lead times.
ITS Application Entity	ISO 21219-15	Intelligent transport systems -- Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) -- Part 15: Traffic event compact (TPEG2-TEC)	ISO/TS 21219-15 specifies the TPEG application: Traffic Event Compact. This application has been specifically designed to support information about traffic events (e.g. road works, traffic jams). A specific form of traffic events are local hazard warnings which, being safety-related messages, are sent with high priority to warn a driver that may encounter dangerous situations (e.g. black-ice, accident beyond curves, obstacles on road, etc.) unexpectedly.
Facilities	No Standard Needed	No Standard Needed	The services related to this portion of the stack are not critical within the scope of this solution.
TransNet		Proprietary	A proprietary mechanism to provide services for this layer.
Access		Satellite Broadcast Alternatives	A set of alternative standards that includes all satellite-based wireless broadcast technologies.

TPEG2 - Wide Area Broadcast Interfaces

Source	Destination	Flow
LADOTD Social Media	Public	broadcast traveler information
Louisiana 511 Website	Personal Devices	broadcast traveler information
Louisiana 511 Website	Public	broadcast traveler information
Media	Personal Devices	broadcast traveler information
Media	Public	broadcast traveler information

US: ADMS - Secure Internet (ITS) Details

Solution Description: This solution is used within Canada and the U.S.. It combines standards associated with US: ADMS with those for I-I: Secure Internet (ITS). The US: ADMS standards include upper-layer standards required to implement interfaces with an archived data management system. The I-I: Secure Internet (ITS) standards include lower-layer standards that support secure communications between ITS equipment using X.509 or IEEE 1609.2 security certificates.



US: ADMS - Secure Internet (ITS) Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
ITS Application Entity	ASTM E2259-03a	Standard Guide for Archiving and Retrieving ITS-Generated Data	This guide deals in general with the questions of what data and information should be considered for archiving as well as what data and information should be considered for retrieval.
ITS Application Entity	ASTM E2468-05	Standard Practice for Metadata to Support Archived Data Management Systems	This standard describes a hierarchical outline of sections and elements to be used in developing metadata to support archived data management systems. Specifically, the standard establishes the names of metadata elements and compound elements to be used in the metadata, the definitions of these metadata elements and compound elements, and suggested information about and examples of the values that are to be provided for the metadata elements.



Level	Document Number	Title	Description
ITS Application Entity	ASTM E2665-08	Standard Specification for Archiving ITS-Generated Traffic Monitoring Data	This specification describes data elements and schema for an archived data management system for ITS-generated traffic monitoring data, including conventional traffic monitoring data, data collected directly from ITS systems, and travel-time data from probe vehicles. It establishes the names of the data elements, their interrelationships, and their procedural definitions. These procedural definitions include data collection instrumentation and methodology as well as recommended procedures for calculating traffic statistics.
Facilities		Standard(s) need to be developed	One or more standards need to be developed for this subject matter before this is considered a complete solution.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access		Internet Subnet Alternatives	A set of alternative standards that includes any Subnet Layer method of connecting to the Internet.

US: ADMS - Secure Internet (ITS) Interfaces

Source	Destination	Flow
Airports	Local Planning Organizations	parking archive data
CVO Inspection Stations	Local Planning Organizations	archived data product requests
CVO Inspection Stations	Local Planning Organizations	asset archive data
DEQ	Local Planning Organizations	archived data product requests
DEQ	Local Planning Organizations	emissions archive data
ITS Field Equipment	LADOTD ITS Section 56	local situation data
ITS Field Equipment	TMC	local situation data
LADOTD District Traffic Operations	Local Planning Organizations	archived data product requests
LADOTD District Traffic Operations	Transportation Database	archive analysis requests
LADOTD District Traffic Operations	Transportation Database	archived data product requests
LADOTD District Traffic Operations	Transportation Database	traffic archive data
LADOTD ITS Section 56	TMC	archive analysis results
LADOTD ITS Section 56	TMC	maint and constr archive data



Source	Destination	Flow
LADOTD ITS Section 56	TMC	traffic archive data
Local DPW	Local Planning Organizations	archive status
Local DPW	Local Planning Organizations	archived data product requests
Local DPW	Local Planning Organizations	archived data products
Local DPW	Local Planning Organizations	maint and constr archive data
Local DPW	Local Planning Organizations	traffic archive data
Local DPW	TMC	archive analysis results
Local DPW	TMC	archive status
Local DPW	TMC	archived data product requests
Local DPW	TMC	archived data products
Local DPW	TMC	maint and constr archive data
Local DPW	TMC	traffic archive data
Local Planning Organizations	CVO Inspection Stations	archive status
Local Planning Organizations	CVO Inspection Stations	archived data products
Local Planning Organizations	DEQ	archived data products
Local Planning Organizations	Local DPW	archive status
Local Planning Organizations	Local DPW	archived data product requests
Local Planning Organizations	Local DPW	archived data products
Local Planning Organizations	Local DPW	asset archive data
Local Planning Organizations	Ports	archive status
Local Planning Organizations	TMC	archive analysis requests
Local Planning Organizations	TMC	archive analysis results
Local Planning Organizations	TMC	archive status
Local Planning Organizations	TMC	archived data product requests
Local Planning Organizations	TMC	archived data products
Local Planning Organizations	TMC	asset archive data
Local Planning Organizations	Transportation Database	archived data product requests
Local Planning Organizations	Transportation Database	asset archive data
Louisiana 511 Website	LADOTD ITS Section 56	traveler archive data
Louisiana 511 Website	TMC	traveler archive data
LSP	TMC	archived data product requests
LSP	TMC	traffic archive data
Ports	Local Planning Organizations	intermodal freight archive data
Ports	TMC	intermodal freight archive data
TMC	Local Planning Organizations	traffic archive data
TMC	Transportation Database	archive analysis requests
TMC	Transportation Database	traffic archive data
Transportation Database	CVO Inspection Stations	archive status
Transportation Database	CVO Inspection Stations	archived data products
Transportation Database	LADOTD District Traffic Operations	archive status
Transportation Database	LADOTD District Traffic Operations	archived data products
Transportation Database	Local Planning Organizations	archive status
Transportation Database	Local Planning Organizations	archived data products
Transportation Database	TMC	archive status



Source	Destination	Flow
Transportation Database	TMC	archived data products

US: ATIS - Secure Internet (ITS) Details

Solution Description: This solution is used within the U.S.. It combines standards associated with US: ATIS with those for I-I: Secure Internet (ITS). The US: ATIS standards include upper-layer standards required to implement traveler information communications. The I-I: Secure Internet (ITS) standards include lower-layer standards that support secure communications between ITS equipment using X.509 or IEEE 1609.2 security certificates.

US: ATIS - Secure Internet (ITS) Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.



Level	Document Number	Title	Description
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
ITS Application Entity	SAE J2353	Data Dictionary for Advanced Traveler Information Systems (ATIS)	This document provides a set of core data elements needed by information service providers for Advanced Traveler Information Systems (ATIS). The data dictionary herein provides the foundation for ATIS message sets for all stages of travel (pre-trip and en route), all types of travelers (drivers, passengers), all categories of information, and all platforms for delivery of information (in-vehicle, portable devices, kiosks, etc.). The elements of this document are the basis for the SAE ATIS Message Set Standard J2354 and are entered into the SAE Data Registry for ITS wide coordination.
Facilities	IETF RFC 9110	HTTP Semantics	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document describes the overall architecture of HTTP, establishes common terminology, and defines aspects of the protocol that are shared by all versions. In this definition are core protocol elements, extensibility mechanisms, and the "http" and "https" Uniform Resource Identifier (URI) schemes.
Facilities	IETF RFC 9112	HTTP/1.1	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document specifies the HTTP/1.1 message syntax, message parsing, connection management, and related security concerns.
Facilities	W3C XML	Extensible Markup Language (XML) 1.0 (Fifth Edition)	This standard defines a generic markup language that can be used to share customizable information by using start and stop tags within the text.
Facilities	SAE J2354	Message Sets for Advanced Traveler Information System (ATIS)	This standard defines how to exchange data for Advanced Traveler Information Systems (ATIS). The messages contained herein address all stages of travel (pre-trip and en-route), all types of travelers (drivers, passengers), all categories of information, and all platforms for delivery of information (in-vehicle, portable devices, kiosks, etc.).
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access		Internet Subnet Alternatives	A set of alternative standards that includes any Subnet Layer method of connecting to the Internet.



US: ATIS - Secure Internet (ITS) Interfaces

Source	Destination	Flow
GOHSEP	Media	traveler information for media
Louisiana 511 Website	TMC	alternate mode information
Louisiana 511 Website	TMC	fare and price information
LSP	Media	traffic information for media

US: ATIS - Secure Wireless Internet (ITS) Details

Solution Description: This solution is used within the U.S.. It combines standards associated with US: ATIS with those for I-M: Secure Wireless Internet (ITS). The US: ATIS standards include upper-layer standards required to implement traveler information communications. The I-M: Secure Wireless Internet (ITS) standards include lower-layer standards that support secure communications between two entities, either or both of which may be mobile devices, but they must be stationary or only moving within wireless range of a single wireless access point (e.g., a parked car). Security is based on X.509 or IEEE 1609.2 certificates. A non-mobile (if any) endpoint may connect to the service provider using any Internet connection method.

US: ATIS - Secure Wireless Internet (ITS) Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.



Level	Document Number	Title	Description
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
ITS Application Entity	SAE J2353	Data Dictionary for Advanced Traveler Information Systems (ATIS)	This document provides a set of core data elements needed by information service providers for Advanced Traveler Information Systems (ATIS). The data dictionary herein provides the foundation for ATIS message sets for all stages of travel (pre-trip and en route), all types of travelers (drivers, passengers), all categories of information, and all platforms for delivery of information (in-vehicle, portable devices, kiosks, etc.). The elements of this document are the basis for the SAE ATIS Message Set Standard J2354 and are entered into the SAE Data Registry for ITS wide coordination.
Facilities	IETF RFC 9110	HTTP Semantics	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document describes the overall architecture of HTTP, establishes common terminology, and defines aspects of the protocol that are shared by all versions. In this definition are core protocol elements, extensibility mechanisms, and the "http" and "https" Uniform Resource Identifier (URI) schemes.
Facilities	IETF RFC 9112	HTTP/1.1	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document specifies the HTTP/1.1 message syntax, message parsing, connection management, and related security concerns.
Facilities	W3C XML	Extensible Markup Language (XML) 1.0 (Fifth Edition)	This standard defines a generic markup language that can be used to share customizable information by using start and stop tags within the text.
Facilities	SAE J2354	Message Sets for Advanced Traveler Information System (ATIS)	This standard defines how to exchange data for Advanced Traveler Information Systems (ATIS). The messages contained herein address all stages of travel (pre-trip and en-route), all types of travelers (drivers, passengers), all categories of information, and all platforms for delivery of information (in-vehicle, portable devices, kiosks, etc.).
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).



Level	Document Number	Title	Description
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access	3GPP Network	3GPP Cellular Communications Network	This proxy standard represents a variety of 3GPP releases and underlying standards and technologies that rely upon cellular base stations for connectivity, including 3G, 4G, and the evolving 5G technologies.

US: ATIS - Secure Wireless Internet (ITS) Interfaces

Source	Destination	Flow
LADOTD Social Media	Personal Devices	interactive traveler information
LADOTD Social Media	Public	interactive traveler information
Louisiana 511 Website	Personal Devices	interactive traveler information
Louisiana 511 Website	Public	interactive traveler information
Media	Personal Devices	interactive traveler information
Personal Devices	Louisiana 511 Website	traveler request
Personal Devices	Media	traveler request
Public	LADOTD Social Media	traveler request
Public	Louisiana 511 Website	traveler request

US: ATIS - Wide Area Broadcast Details

Solution Description: This solution is used within the U.S.. It combines standards associated with US: ATIS with those for C-X: Wide Area Broadcast. The US: ATIS standards include upper-layer standards required to implement traveler information communications. The C-X: Wide Area Broadcast standards include lower-layer standards that support one entity broadcasting information to all wireless devices over an area that covers at least a metropolitan area without any expectation of acknowledgement or response; security is provided by the upper-layers.

US: ATIS - Wide Area Broadcast Standards

Level	Document Number	Title	Description
Mgmt		Proprietary	A proprietary mechanism to provide services for this layer.
Security		Proprietary	A proprietary mechanism to provide services for this layer.



Level	Document Number	Title	Description
ITS Application Entity	SAE J2353	Data Dictionary for Advanced Traveler Information Systems (ATIS)	This document provides a set of core data elements needed by information service providers for Advanced Traveler Information Systems (ATIS). The data dictionary herein provides the foundation for ATIS message sets for all stages of travel (pre-trip and en route), all types of travelers (drivers, passengers), all categories of information, and all platforms for delivery of information (in-vehicle, portable devices, kiosks, etc.). The elements of this document are the basis for the SAE ATIS Message Set Standard J2354 and are entered into the SAE Data Registry for ITS wide coordination.
Facilities	IETF RFC 9110	HTTP Semantics	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document describes the overall architecture of HTTP, establishes common terminology, and defines aspects of the protocol that are shared by all versions. In this definition are core protocol elements, extensibility mechanisms, and the "http" and "https" Uniform Resource Identifier (URI) schemes.
Facilities	IETF RFC 9112	HTTP/1.1	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document specifies the HTTP/1.1 message syntax, message parsing, connection management, and related security concerns.
Facilities	W3C XML	Extensible Markup Language (XML) 1.0 (Fifth Edition)	This standard defines a generic markup language that can be used to share customizable information by using start and stop tags within the text.
Facilities	SAE J2354	Message Sets for Advanced Traveler Information System (ATIS)	This standard defines how to exchange data for Advanced Traveler Information Systems (ATIS). The messages contained herein address all stages of travel (pre-trip and en-route), all types of travelers (drivers, passengers), all categories of information, and all platforms for delivery of information (in-vehicle, portable devices, kiosks, etc.).
TransNet		Proprietary	A proprietary mechanism to provide services for this layer.
Access		Satellite Broadcast Alternatives	A set of alternative standards that includes all satellite-based wireless broadcast technologies.

US: ATIS - Wide Area Broadcast Interfaces

Source	Destination	Flow
GOHSEP	Personal Devices	traveler alerts
LADOTD Social Media	Personal Devices	traveler alerts
LADOTD Social Media	Public	traveler alerts
Louisiana 511 Website	Personal Devices	traveler alerts
Louisiana 511 Website	Public	traveler alerts
Media	Personal Devices	traveler alerts

US: CDS - Secure Internet (ITS) Details

Solution Description: This solution is used within the U.S.. It combines standards associated with US: CDS with those for I-I: Secure Internet (ITS). The US: CDS standards include upper-layer standards required to manage the curb-space using CDS standards. The I-I: Secure Internet (ITS) standards include lower-layer standards that support secure communications between ITS equipment using X.509 or IEEE 1609.2 security certificates.



US: CDS - Secure Internet (ITS) Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
ITS Application Entity	CDS	Curb Data Specification	The Curb Data Specification (CDS), a project of the Open Mobility Foundation (OMF), is a data standard and set of Application Programming Interfaces (APIs) that helps cities manage and companies use dynamic curb zones that optimize loading activities of people and goods, and measure the impact of these programs.
Facilities	IETF RFC 7159	The JavaScript Object Notation (JSON) Data Interchange Format	The JavaScript Object Notation (JSON), a lightweight, text-based, language-independent data interchange format. It was derived from the ECMAScript Programming Language Standard. JSON defines a small set of formatting rules for the portable representation of structured data. This document removes inconsistencies with other specifications of JSON, repairs specification errors, and offers experience-based interoperability guidance.



Level	Document Number	Title	Description
Facilities	IETF RFC 9110	HTTP Semantics	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document describes the overall architecture of HTTP, establishes common terminology, and defines aspects of the protocol that are shared by all versions. In this definition are core protocol elements, extensibility mechanisms, and the "http" and "https" Uniform Resource Identifier (URI) schemes.
Facilities	IETF RFC 9112	HTTP/1.1	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document specifies the HTTP/1.1 message syntax, message parsing, connection management, and related security concerns.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access		Internet Subnet Alternatives	A set of alternative standards that includes any Subnet Layer method of connecting to the Internet.

US: CDS - Secure Internet (ITS) Interfaces

Source	Destination	Flow
Airports	TMC	parking information
Louisiana 511 Website	TMC	parking information

US: GTFS real-time - Guaranteed Secure Internet (ITS)Details

Solution Description: This solution is used within the U.S.. It combines standards associated with US: GTFS real-time with those for I-I: Guaranteed Secure Internet (ITS). The US: GTFS real-time standards include upper-layer standards required to implement real-time, public, transit-related communications. The I-I: Guaranteed Secure Internet (ITS) standards include lower-layer standards that support secure communications with guaranteed delivery between ITS equipment using X.509 or IEEE 1609.2 security certificates.



US: GTFS real-time - Guaranteed Secure Internet (ITS) Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
ITS Application Entity	GTFS Realtime	General Transit Feed Specification Realtime	This document defines a feed specification that allows public transportation agencies to provide real-time updates about their fleet to application developers. It is an extension to GTFS (General Transit Feed Specification), an open data format for public transportation schedules and associated geographic information. GTFS Realtime was designed around ease of implementation, good GTFS interoperability and a focus on passenger information.



Level	Document Number	Title	Description
Facilities	IETF RFC 9110	HTTP Semantics	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document describes the overall architecture of HTTP, establishes common terminology, and defines aspects of the protocol that are shared by all versions. In this definition are core protocol elements, extensibility mechanisms, and the "http" and "https" Uniform Resource Identifier (URI) schemes.
Facilities	IETF RFC 9112	HTTP/1.1	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document specifies the HTTP/1.1 message syntax, message parsing, connection management, and related security concerns.
Facilities	ISO 21320-1	Information technology — Document Container File — Part 1: Core	ISO/IEC 21320-1 specifies the core requirements for 1) document container files, and 2) implementations that produce and/or consume document container files. It normatively references the Zip File Format Specification version 6.3.3 of PKWARE(R) Inc. Document container files are conforming Zip files as specified by that document.
Facilities	IETF RFC 4180	Common Format and MIME Type for Comma-Separated Values (CSV) Files	This standard (RFC) documents the format used for Comma-Separated Values (CSV) files and registers the associated MIME type "text/csv".
Facilities	IETF RFC 7159	The JavaScript Object Notation (JSON) Data Interchange Format	The JavaScript Object Notation (JSON), a lightweight, text-based, language-independent data interchange format. It was derived from the ECMAScript Programming Language Standard. JSON defines a small set of formatting rules for the portable representation of structured data. This document removes inconsistencies with other specifications of JSON, repairs specification errors, and offers experience-based interoperability guidance.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access		Internet Subnet Alternatives	A set of alternative standards that includes any Subnet Layer method of connecting to the Internet.



US: GTFS real-time - Guaranteed Secure Internet (ITS) Interfaces

Source	Destination	Flow
Public Transit Services	Emergency 911 Centers	emergency transit schedule information

US: GTFS real-time - Secure Internet (ITS) Details

Solution Description: This solution is used within the U.S.. It combines standards associated with US: GTFS real-time with those for I-I: Secure Internet (ITS). The US: GTFS real-time standards include upper-layer standards required to implement real-time, public, transit-related communications. The I-I: Secure Internet (ITS) standards include lower-layer standards that support secure communications between ITS equipment using X.509 or IEEE 1609.2 security certificates.

US: GTFS real-time - Secure Internet (ITS) Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
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Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
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Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.



Level	Document Number	Title	Description
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
ITS Application Entity	GTFS Realtime	General Transit Feed Specification Realtime	This document defines a feed specification that allows public transportation agencies to provide real-time updates about their fleet to application developers. It is an extension to GTFS (General Transit Feed Specification), an open data format for public transportation schedules and associated geographic information. GTFS Realtime was designed around ease of implementation, good GTFS interoperability and a focus on passenger information.
Facilities	IETF RFC 9110	HTTP Semantics	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document describes the overall architecture of HTTP, establishes common terminology, and defines aspects of the protocol that are shared by all versions. In this definition are core protocol elements, extensibility mechanisms, and the "http" and "https" Uniform Resource Identifier (URI) schemes.
Facilities	IETF RFC 9112	HTTP/1.1	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document specifies the HTTP/1.1 message syntax, message parsing, connection management, and related security concerns.
Facilities	ISO 21320-1	Information technology — Document Container File — Part 1: Core	ISO/IEC 21320-1 specifies the core requirements for 1) document container files, and 2) implementations that produce and/or consume document container files. It normatively references the Zip File Format Specification version 6.3.3 of PKWARE(R) Inc. Document container files are conforming Zip files as specified by that document.
Facilities	IETF RFC 4180	Common Format and MIME Type for Comma-Separated Values (CSV) Files	This standard (RFC) documents the format used for Comma-Separated Values (CSV) files and registers the associated MIME type "text/csv".
Facilities	IETF RFC 7159	The JavaScript Object Notation (JSON) Data Interchange Format	The JavaScript Object Notation (JSON), a lightweight, text-based, language-independent data interchange format. It was derived from the ECMAScript Programming Language Standard. JSON defines a small set of formatting rules for the portable representation of structured data. This document removes inconsistencies with other specifications of JSON, repairs specification errors, and offers experience-based interoperability guidance.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).



Level	Document Number	Title	Description
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access		Internet Subnet Alternatives	A set of alternative standards that includes any Subnet Layer method of connecting to the Internet.

GTFS Real-time - Secure Internet (ITS) Interfaces

Source	Destination	Flow
Public Transit Services	Louisiana 511 Website	emergency transit schedule information
Public Transit Services	Media	emergency transit schedule information
Public Transit Services	Media	transit schedule adherence information

US: GTFS static - Secure Internet (ITS) Details

Solution Description: This solution is used within the U.S.. It combines standards associated with US: GTFS static with those for I-I: Secure Internet (ITS). The US: GTFS static standards include upper-layer standards required to implement static, public, transit-related communications. The I-I: Secure Internet (ITS) standards include lower-layer standards that support secure communications between ITS equipment using X.509 or IEEE 1609.2 security certificates.

US: GTFS static - Secure Internet (ITS) Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.



Level	Document Number	Title	Description
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
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Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
ITS Application Entity	GTFS	General Transit Feed Specification	This document defines a common (open data) format for exchanging public transportation schedules and associated geographic information.
Facilities	IETF RFC 9110	HTTP Semantics	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document describes the overall architecture of HTTP, establishes common terminology, and defines aspects of the protocol that are shared by all versions. In this definition are core protocol elements, extensibility mechanisms, and the "http" and "https" Uniform Resource Identifier (URI) schemes.
Facilities	IETF RFC 9112	HTTP/1.1	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document specifies the HTTP/1.1 message syntax, message parsing, connection management, and related security concerns.
Facilities	ISO 21320-1	Information technology — Document Container File — Part 1: Core	ISO/IEC 21320-1 specifies the core requirements for 1) document container files, and 2) implementations that produce and/or consume document container files. It normatively references the Zip File Format Specification version 6.3.3 of PKWARE(R) Inc. Document container files are conforming Zip files as specified by that document.
Facilities	IETF RFC 4180	Common Format and MIME Type for Comma-Separated Values (CSV) Files	This standard (RFC) documents the format used for Comma-Separated Values (CSV) files and registers the associated MIME type "text/csv".



Level	Document Number	Title	Description
Facilities	IETF RFC 7159	The JavaScript Object Notation (JSON) Data Interchange Format	The JavaScript Object Notation (JSON), a lightweight, text-based, language-independent data interchange format. It was derived from the ECMAScript Programming Language Standard. JSON defines a small set of formatting rules for the portable representation of structured data. This document removes inconsistencies with other specifications of JSON, repairs specification errors, and offers experience-based interoperability guidance.
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TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access		Internet Subnet Alternatives	A set of alternative standards that includes any Subnet Layer method of connecting to the Internet.

US: GTFS static - Secure Internet (ITS) Interfaces

Source	Destination	Flow
Public Transit Services	Event Promoter	transit fare information

US: NTCIP Data Collection - SNMPv3/TLS Details

Solution Description: This solution is used within the U.S.. It combines standards associated with US: NTCIP Data Collection with those for I-F: SNMPv3/TLS. The US: NTCIP Data Collection standards include upper-layer standards required to implement center-to-field communications for data collection and monitoring of traffic characteristics (e.g., non-real-time data). The I-F: SNMPv3/TLS standards include lower-layer standards that support secure center-to-field and field-to-field communications using simple network management protocol (SNMPv3); implementations are strongly encouraged to use the TLS for SNMP security option for this solution to ensure adequate security.

NTCIP Data Collection - SNMPv3/TLS Standards

Level	Document Number	Title	Description
Mgmt	NTCIP 1201	NTCIP Global Object (GO) Definitions	This standard defines SNMP objects (data elements) used by a wide range of field devices like time and versioning information.



Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 6353	Transport Layer Security (TLS) Transport Model for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines how to use the TLS authentication service to provide authentication within the access control mechanism of SNMP.
ITS Application Entity	NTCIP 1206	NTCIP Object Definitions for Data Collection	This standard defines SNMP objects (data elements) for data collection and monitoring (DCM) equipment.
ITS Application Entity	NTCIP 1209	NTCIP Object Definitions for Transportation Sensor Systems (TSS)	This standard defines SNMP objects (data elements) to monitor and control transportation system sensors that measure real-time vehicular traffic information.
Facilities	NTCIP 1206	NTCIP Object Definitions for Data Collection	This standard defines SNMP objects (data elements) for data collection and monitoring (DCM) equipment.
Facilities	NTCIP 1209	NTCIP Object Definitions for Transportation Sensor Systems (TSS)	This standard defines SNMP objects (data elements) to monitor and control transportation system sensors that measure real-time vehicular traffic information.
Facilities	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.



Level	Document Number	Title	Description
Facilities	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Facilities	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Facilities	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Facilities	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Facilities	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access	NTCIP 2104	NTCIP SP-Ethernet	This standard defines the Access Layer for center-to-field communications where the local connection is some variant of Ethernet.

NTCIP Data Collection - SNMPv3/TLS Interfaces

Source	Destination	Flow
CVO Inspection Stations	Transportation Database	roadside archive data
ITS Field Equipment	LADOTD ITS Section 56	roadside archive data
ITS Field Equipment	TMC	roadside archive data



Source	Destination	Flow
LADOTD District Traffic Operations	ITS Field Equipment	data collection and monitoring control
LADOTD District Traffic Operations	Workzone ITS	data collection and monitoring control
LADOTD ITS Section 56	ITS Field Equipment	data collection and monitoring control
TMC	ITS Field Equipment	data collection and monitoring control
TMC	Traffic Signal Systems	data collection and monitoring control
TMC	Workzone ITS	data collection and monitoring control

US: NTCIP Environmental Sensors - SNMPv3/TLS Details

Solution Description: This solution is used within the U.S.. It combines standards associated with US: NTCIP Environmental Sensors with those for I-F: SNMPv3/TLS. The US: NTCIP Environmental Sensors standards include upper-layer standards required to implement center-to-field weather and environmental sensor communications. The I-F: SNMPv3/TLS standards include lower-layer standards that support secure center-to-field and field-to-field communications using simple network management protocol (SNMPv3); implementations are strongly encouraged to use the TLS for SNMP security option for this solution to ensure adequate security.

NTCIP Environmental Sensors - SNMPv3/TLS Standards

Level	Document Number	Title	Description
Mgmt	NTCIP 1201	NTCIP Global Object (GO) Definitions	This standard defines SNMP objects (data elements) used by a wide range of field devices like time and versioning information.
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.



Level	Document Number	Title	Description
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 6353	Transport Layer Security (TLS) Transport Model for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines how to use the TLS authentication service to provide authentication within the access control mechanism of SNMP.
ITS Application Entity	NTCIP 1204	NTCIP Environmental Sensor Station Interface Standard	This standard defines SNMP objects (data elements) for monitoring and controlling environmental sensor stations (especially road weather stations).
Facilities	NTCIP 1204	NTCIP Environmental Sensor Station Interface Standard	This standard defines SNMP objects (data elements) for monitoring and controlling environmental sensor stations (especially road weather stations).
Facilities	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Facilities	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Facilities	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Facilities	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Facilities	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Facilities	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).



Level	Document Number	Title	Description
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access	NTCIP 2104	NTCIP SP-Ethernet	This standard defines the Access Layer for center-to-field communications where the local connection is some variant of Ethernet.

NTCIP Environmental Sensors - SNMPv3/TLS Interfaces

Source	Destination	Flow
ITS Field Equipment	LADOTD ITS Section 56	environmental sensor data
ITS Field Equipment	TMC	environmental sensor data
LADOTD Flood Warning Systems	TMC	environmental sensor data
LADOTD ITS Section 56	ITS Field Equipment	environmental sensor control
TMC	ITS Field Equipment	environmental sensor control

US: NTCIP Message Sign - SNMPv3/TLS Details

Solution Description: This solution is used within the U.S.. It combines standards associated with US: NTCIP Message Sign with those for I-F: SNMPv3/TLS. The US: NTCIP Message Sign standards include upper-layer standards required to implement center-to-field message sign communications. The I-F: SNMPv3/TLS standards include lower-layer standards that support secure center-to-field and field-to-field communications using simple network management protocol (SNMPv3); implementations are strongly encouraged to use the TLS for SNMP security option for this solution to ensure adequate security.

NTCIP Message Sign - SNMPv3/TLS Standards

Level	Document Number	Title	Description
Mgmt	NTCIP 1201	NTCIP Global Object (GO) Definitions	This standard defines SNMP objects (data elements) used by a wide range of field devices like time and versioning information.
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.



Level	Document Number	Title	Description
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 6353	Transport Layer Security (TLS) Transport Model for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines how to use the TLS authentication service to provide authentication within the access control mechanism of SNMP.
ITS Application Entity	NTCIP 1203	NTCIP Object Definitions for Dynamic Message Signs (DMS)	This standard defines SNMP objects (data elements) for monitoring and controlling dynamic message signs (such as variable message signs).
Facilities	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Facilities	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Facilities	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.



Level	Document Number	Title	Description
Facilities	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Facilities	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Facilities	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Facilities	NTCIP 1203	NTCIP Object Definitions for Dynamic Message Signs (DMS)	This standard defines SNMP objects (data elements) for monitoring and controlling dynamic message signs (such as variable message signs).
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access	NTCIP 2104	NTCIP SP-Ethernet	This standard defines the Access Layer for center-to-field communications where the local connection is some variant of Ethernet.

NTCIP Message Sign - SNMPv3/TLS Interfaces

Source	Destination	Flow
ITS Field Equipment	TMC	roadway dynamic signage status
Local DPW	Traffic Signal Systems	roadway dynamic signage data
TMC	CVO Inspection Stations	roadway dynamic signage data

US: NTCIP Ramp Meters - SNMPv3/TLS Details



Solution Description: This solution is used within the U.S.. It combines standards associated with US: NTCIP Ramp Meters with those for I-F: SNMPv3/TLS. The US: NTCIP Ramp Meters standards include upper-layer standards required to implement center-to-field ramp meter communications. The I-F: SNMPv3/TLS standards include lower-layer standards that support secure center-to-field and field-to-field communications using simple network management protocol (SNMPv3); implementations are strongly encouraged to use the TLS for SNMP security option for this solution to ensure adequate security.

NTCIP Ramp Meters - SNMPv3/TLS Standards

Level	Document Number	Title	Description
Mgmt	NTCIP 1201	NTCIP Global Object (GO) Definitions	This standard defines SNMP objects (data elements) used by a wide range of field devices like time and versioning information.
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 6353	Transport Layer Security (TLS) Transport Model for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines how to use the TLS authentication service to provide authentication within the access control mechanism of SNMP.
ITS Application Entity	NTCIP 1207	NTCIP Object Definitions for Ramp Meter Control (RMC)	This standard defines SNMP objects (data elements) to monitor and control ramp meters.



Level	Document Number	Title	Description
Facilities	NTCIP 1207	NTCIP Object Definitions for Ramp Meter Control (RMC)	This standard defines SNMP objects (data elements) to monitor and control ramp meters.
Facilities	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Facilities	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Facilities	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Facilities	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Facilities	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Facilities	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access	NTCIP 2104	NTCIP SP-Ethernet	This standard defines the Access Layer for center-to-field communications where the local connection is some variant of Ethernet.



NTCIP Ramp Meters - SNMPv3/TLS Interfaces

Source	Destination	Flow
ITS Field Equipment	LADOTD District Traffic Operations	traffic metering status
ITS Field Equipment	LADOTD ITS Section 56	traffic metering status
ITS Field Equipment	TMC	traffic metering status

US: NTCIP Signal System Masters - SNMPv3/TLS Details

Solution Description: This solution is used within the U.S.. It combines standards associated with US: NTCIP Signal System Masters with those for I-F: SNMPv3/TLS. The US: NTCIP Signal System Masters standards include upper-layer standards required to implement center-to-field signal-system master communications. The I-F: SNMPv3/TLS standards include lower-layer standards that support secure center-to-field and field-to-field communications using simple network management protocol (SNMPv3); implementations are strongly encouraged to use the TLS for SNMP security option for this solution to ensure adequate security.

NTCIP Signal System Masters - SNMPv3/TLS Standards

Level	Document Number	Title	Description
Mgmt	NTCIP 1201	NTCIP Global Object (GO) Definitions	This standard defines SNMP objects (data elements) used by a wide range of field devices like time and versioning information.
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.



Level	Document Number	Title	Description
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 6353	Transport Layer Security (TLS) Transport Model for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines how to use the TLS authentication service to provide authentication within the access control mechanism of SNMP.
ITS Application Entity	NTCIP 1202	NTCIP Object Definitions for ASC	This standard defines SNMP objects (data elements) for a center to control a traffic signal and its interface with connected vehicles.
ITS Application Entity	NTCIP 1210	NTCIP Objects for Signal System Masters	This standard defines SNMP objects (data elements) for monitoring and controlling signal system master controllers.
Facilities	NTCIP 1202	NTCIP Object Definitions for ASC	This standard defines SNMP objects (data elements) for a center to control a traffic signal and its interface with connected vehicles.
Facilities	NTCIP 1210	NTCIP Objects for Signal System Masters	This standard defines SNMP objects (data elements) for monitoring and controlling signal system master controllers.
Facilities	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Facilities	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Facilities	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Facilities	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Facilities	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Facilities	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.



Level	Document Number	Title	Description
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access	NTCIP 2104	NTCIP SP-Ethernet	This standard defines the Access Layer for center-to-field communications where the local connection is some variant of Ethernet.

US: NTCIP Signal System Masters - SNMPv3/TLS Interfaces

Source	Destination	Flow
ITS Field Equipment	LADOTD District Traffic Operations	signal fault data
ITS Field Equipment	LADOTD ITS Section 56	signal fault data
ITS Field Equipment	TMC	signal fault data
LADOTD District Traffic Operations	ITS Field Equipment	signal control commands
LADOTD District Traffic Operations	Traffic Signal Systems	signal control device configuration
LADOTD District Traffic Operations	Traffic Signal Systems	signal control plans
LADOTD ITS Section 56	ITS Field Equipment	signal control commands
LADOTD ITS Section 56	ITS Field Equipment	signal control device configuration
LADOTD ITS Section 56	ITS Field Equipment	signal control plans
LADOTD ITS Section 56	ITS Field Equipment	signal system configuration
Local DPW	Traffic Signal Systems	signal control commands
Local DPW	Traffic Signal Systems	signal control device configuration
Local DPW	Traffic Signal Systems	signal control plans
Local DPW	Traffic Signal Systems	signal system configuration
TMC	Traffic Signal Systems	signal control commands
TMC	Traffic Signal Systems	signal control device configuration
TMC	Traffic Signal Systems	signal control plans
TMC	Traffic Signal Systems	signal system configuration
Traffic Signal Systems	TMC	signal fault data



US: NTCIP Traffic Signal - SNMPv3/TLS Details

Solution Description: This solution is used within the U.S. It combines standards associated with US: NTCIP Traffic Signal with those for I-F: SNMPv3/TLS. The US: NTCIP Traffic Signal standards include upper-layer standards required to implement center-to-field traffic signal communications. The I-F: SNMPv3/TLS standards include lower-layer standards that support secure center-to-field and field-to-field communications using simple network management protocol (SNMPv3); implementations are strongly encouraged to use the TLS for SNMP security option for this solution to ensure adequate security.

US: NTCIP Traffic Signal - SNMPv3/TLS Standards

Level	Document Number	Title	Description
Mgmt	NTCIP 1201	NTCIP Global Object (GO) Definitions	This standard defines SNMP objects (data elements) used by a wide range of field devices like time and versioning information.
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.



Level	Document Number	Title	Description
Security	IETF RFC 6353	Transport Layer Security (TLS) Transport Model for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines how to use the TLS authentication service to provide authentication within the access control mechanism of SNMP.
ITS Application Entity	NTCIP 1202	NTCIP Object Definitions for ASC	This standard defines SNMP objects (data elements) for a center to control a traffic signal and its interface with connected vehicles.
Facilities	NTCIP 1202	NTCIP Object Definitions for ASC	This standard defines SNMP objects (data elements) for a center to control a traffic signal and its interface with connected vehicles.
Facilities	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Facilities	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Facilities	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Facilities	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Facilities	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Facilities	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).



Level	Document Number	Title	Description
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access	NTCIP 2104	NTCIP SP-Ethernet	This standard defines the Access Layer for center-to-field communications where the local connection is some variant of Ethernet.

US: NTCIP Traffic Signal - SNMPv3/TLS Interfaces

Source	Destination	Flow
ITS Field Equipment	LADOTD District Traffic Operations	signal control status
ITS Field Equipment	LADOTD ITS Section 56	signal control status
ITS Field Equipment	TMC	signal control status

US: NTCIP Transportation Sensors - SNMPv3/TLS Details

Solution Description: This solution is used within the U.S. It combines standards associated with US: NTCIP Transportation Sensors with those for I-F: SNMPv3/TLS. The US: NTCIP Transportation Sensors standards include upper-layer standards required to implement center-to-field transportation sensors (e.g., vehicle detectors) communications (e.g., real-time). The I-F: SNMPv3/TLS standards include lower-layer standards that support secure center-to-field and field-to-field communications using simple network management protocol (SNMPv3); implementations are strongly encouraged to use the TLS for SNMP security option for this solution to ensure adequate security.

US: NTCIP Transportation Sensors - SNMPv3/TLS Standards

Level	Document Number	Title	Description
Mgmt	NTCIP 1201	NTCIP Global Object (GO) Definitions	This standard defines SNMP objects (data elements) used by a wide range of field devices like time and versioning information.
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.



Level	Document Number	Title	Description
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 6353	Transport Layer Security (TLS) Transport Model for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines how to use the TLS authentication service to provide authentication within the access control mechanism of SNMP.
ITS Application Entity	NTCIP 1209	NTCIP Object Definitions for Transportation Sensor Systems (TSS)	This standard defines SNMP objects (data elements) to monitor and control transportation system sensors that measure real-time vehicular traffic information.
Facilities	NTCIP 1209	NTCIP Object Definitions for Transportation Sensor Systems (TSS)	This standard defines SNMP objects (data elements) to monitor and control transportation system sensors that measure real-time vehicular traffic information.
Facilities	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Facilities	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Facilities	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Facilities	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.



Level	Document Number	Title	Description
Facilities	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Facilities	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access	NTCIP 2104	NTCIP SP-Ethernet	This standard defines the Access Layer for center-to-field communications where the local connection is some variant of Ethernet.

US: NTCIP Transportation Sensors - SNMPv3/TLS Interfaces

Source	Destination	Flow
ITS Field Equipment	LADOTD District Traffic Operations	traffic detector data
ITS Field Equipment	LADOTD ITS Section 56	traffic detector data
ITS Field Equipment	TMC	traffic detector data
LADOTD ITS Section 56	ITS Field Equipment	traffic detector control
Local DPW	Traffic Signal Systems	traffic detector control
TMC	Traffic Signal Systems	traffic detector control
Workzone ITS	LADOTD District Traffic Operations	traffic detector data

US: NTCIP Video Switches - SNMPv3/TLS Details



Solution Description: This solution is used within the U.S. It combines standards associated with US: NTCIP Video Switches with those for I-F: SNMPv3/TLS. The US: NTCIP Video Switches standards include upper-layer standards required to implement center-to-field video switch communications. The I-F: SNMPv3/TLS standards include lower-layer standards that support secure center-to-field and field-to-field communications using simple network management protocol (SNMPv3); implementations are strongly encouraged to use the TLS for SNMP security option for this solution to ensure adequate security.

US: NTCIP Video Switches - SNMPv3/TLS Standards

Level	Document Number	Title	Description
Mgmt	NTCIP 1201	NTCIP Global Object (GO) Definitions	This standard defines SNMP objects (data elements) used by a wide range of field devices like time and versioning information.
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 6353	Transport Layer Security (TLS) Transport Model for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines how to use the TLS authentication service to provide authentication within the access control mechanism of SNMP.



Level	Document Number	Title	Description
ITS Application Entity	NTCIP 1205	NTCIP Objects for CCTV Camera Control	This standard defines SNMP objects (data elements) for control and monitoring of closed-circuit television (CCTV) camera controllers.
ITS Application Entity	NTCIP 1208	NTCIP Object Definitions for Video Switches	This standard defines SNMP objects (data elements) for the control and monitoring of video switches.
Facilities	NTCIP 1205	NTCIP Objects for CCTV Camera Control	This standard defines SNMP objects (data elements) for control and monitoring of closed-circuit television (CCTV) camera controllers.
Facilities	NTCIP 1208	NTCIP Object Definitions for Video Switches	This standard defines SNMP objects (data elements) for the control and monitoring of video switches.
Facilities	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Facilities	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Facilities	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Facilities	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Facilities	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Facilities	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).



Level	Document Number	Title	Description
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access	NTCIP 2104	NTCIP SP-Ethernet	This standard defines the Access Layer for center-to-field communications where the local connection is some variant of Ethernet.

US: NTCIP Video Switches - SNMPv3/TLS Interfaces

Source	Destination	Flow
LADOTD ITS Section 56	ITS Field Equipment	video surveillance control

US: SAE J3067 (J2735 SE) - Secure Internet (ITS) Details

Solution Description: This solution is used within the U.S. It combines standards associated with US: SAE J3067 (J2735 SE) with those for I-I: Secure Internet (ITS). The US: SAE J3067 (J2735 SE) standards include a proposed solution for the upper-layers to implement V2X information flows that do not yet have fully standardized messages, functionality or performance characteristics. The I-I: Secure Internet (ITS) standards include lower-layer standards that support secure communications between ITS equipment using X.509 or IEEE 1609.2 security certificates.

US: SAE J3067 (J2735 SE) - Secure Internet (ITS) Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.



Level	Document Number	Title	Description
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
ITS Application Entity	SAE J3067	Candidate Improvements to Dedicated Short Range Communications (DSRC) Message Set Dictionary [SAE J2735] Using Systems Engineering Methods	This informational report formalized a deliverable received from the USDOT as suggested improvements to SAE J2735:2009. Many of these suggestions have been incorporated into later revisions of SAE J2735 and SAE J2945/x; additional suggestions may be incorporated as the documents are extended to address additional applications.
Facilities	SAE J2945	Dedicated Short Range Communication (DSRC) Systems Engineering Process Guidance for J2945/x Documents and Common Design Concepts	This standard defines cross-cutting material which applies to the J2945/x series including generic DSRC interface requirements and guidance on Systems Engineering (SE) content.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).



Level	Document Number	Title	Description
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access		Internet Subnet Alternatives	A set of alternative standards that includes any Subnet Layer method of connecting to the Internet.

US: SAE J3067 (J2735 SE) - Secure Internet (ITS) Interfaces

Source	Destination	Flow
Commercial Vehicle Operators	CVO Inspection Stations	safety status information

US: SAE J3067 (J2735 SE) - Secure Wireless Internet (ITS) Details

Solution Description: This solution is used within the U.S. It combines standards associated with US: SAE J3067 (J2735 SE) with those for I-M: Secure Wireless Internet (ITS). The US: SAE J3067 (J2735 SE) standards include a proposed solution for the upper-layers to implement V2X information flows that do not yet have fully standardized messages, functionality or performance characteristics. The I-M: Secure Wireless Internet (ITS) standards include lower-layer standards that support secure communications between two entities, either or both of which may be mobile devices, but they must be stationary or only moving within wireless range of a single wireless access point (e.g., a parked car). Security is based on X.509 or IEEE 1609.2 certificates. A non-mobile (if any) endpoint may connect to the service provider using any Internet connection method.

US: SAE J3067 (J2735 SE) - Secure Wireless Internet (ITS) Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.



Level	Document Number	Title	Description
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
ITS Application Entity	SAE J3067	Candidate Improvements to Dedicated Short Range Communications (DSRC) Message Set Dictionary [SAE J2735] Using Systems Engineering Methods	This informational report formalized a deliverable received from the USDOT as suggested improvements to SAE J2735:2009. Many of these suggestions have been incorporated into later revisions of SAE J2735 and SAE J2945/x; additional suggestions may be incorporated as the documents are extended to address additional applications.
Facilities	SAE J2945	Dedicated Short Range Communication (DSRC) Systems Engineering Process Guidance for J2945/x Documents and Common Design Concepts	This standard defines cross-cutting material which applies to the J2945/x series including generic DSRC interface requirements and guidance on Systems Engineering (SE) content.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).



Level	Document Number	Title	Description
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access	3GPP Network	3GPP Cellular Communications Network	This proxy standard represents a variety of 3GPP releases and underlying standards and technologies that rely upon cellular base stations for connectivity, including 3G, 4G, and the evolving 5G technologies.

US: SAE J3067 (J2735 SE) - Secure Wireless Internet (ITS) Interfaces

Source	Destination	Flow
Commercial Vehicles	Commercial Vehicle Operators	commercial vehicle identities

US: TCIP - Guaranteed Secure Internet (ITS) Details

Solution Description: This solution is used within the U.S. It combines standards associated with US: TCIP with those for I-I: Guaranteed Secure Internet (ITS). The US: TCIP standards include upper-layer standards required to implement transit-related communications. The I-I: Guaranteed Secure Internet (ITS) standards include lower-layer standards that support secure communications with guaranteed delivery between ITS equipment using X.509 or IEEE 1609.2 security certificates.

US: TCIP - Guaranteed Secure Internet (ITS) Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.



Level	Document Number	Title	Description
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
ITS Application Entity	APTA TCIP-S-001 Vol 2	Transit Communications Interface Profiles - TCIP Data and Dialog Definitions	This standard defines the data concepts used by the TCIP standard.
Facilities	W3C XML	Extensible Markup Language (XML) 1.0 (Fifth Edition)	This standard defines a generic markup language that can be used to share customizable information by using start and stop tags within the text.
Facilities	APTA TCIP-S-001 Vol 2	Transit Communications Interface Profiles - TCIP Data and Dialog Definitions	This standard defines the data concepts used by the TCIP standard.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).



Level	Document Number	Title	Description
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access		Internet Subnet Alternatives	A set of alternative standards that includes any Subnet Layer method of connecting to the Internet.

US: TCIP - Guaranteed Secure Internet (ITS) Interfaces

Source	Destination	Flow
GOHSEP	Public Transit Services	emergency transit service request
Public Transit Services	GOHSEP	emergency transit service response

US: TMDD - NTCIP Messaging Details

Solution Description: This solution is used within the U.S. It combines standards associated with US: TMDD with those for C-C: NTCIP Messaging. The US: TMDD standards include upper-layer standards required to implement center-to-center communications with traffic management systems. The C-C: NTCIP Messaging standards include lower-layer standards that support partially secure communications between two centers as commonly used in the US.

US: TMDD - NTCIP Messaging Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.



Level	Document Number	Title	Description
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Mgmt	W3C WSDL 1.1	Web Services Description Language (WSDL) 1.1	This standard defines the mechanism for a system to describe the web services that it supports.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
ITS Application Entity	ITE TMDD Vol 2	Traffic Management Data Dictionary Standard for the Center-to-Center Communications: Volume 2: Design Content	This standard defines the messages and data elements for the external center to traffic management center interface.
Facilities	ITE TMDD Vol 2	Traffic Management Data Dictionary Standard for the Center-to-Center Communications: Volume 2: Design Content	This standard defines the messages and data elements for the external center to traffic management center interface.
Facilities	IETF RFC 9110	HTTP Semantics	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document describes the overall architecture of HTTP, establishes common terminology, and defines aspects of the protocol that are shared by all versions. In this definition are core protocol elements, extensibility mechanisms, and the "http" and "https" Uniform Resource Identifier (URI) schemes.
Facilities	IETF RFC 9112	HTTP/1.1	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document specifies the HTTP/1.1 message syntax, message parsing, connection management, and related security concerns.
Facilities	W3C SOAP 1.2	SOAP Version 1.2	This standard defines the structure that can be used to send message-based information between systems using XML.
Facilities	W3C XML	Extensible Markup Language (XML) 1.0 (Fifth Edition)	This standard defines a generic markup language that can be used to share customizable information by using start and stop tags within the text.



Level	Document Number	Title	Description
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access		Internet Subnet Alternatives	A set of alternative standards that includes any Subnet Layer method of connecting to the Internet.

US: TMDD - NTCIP Messaging Interfaces

Source	Destination	Flow
DEQ	Media	air quality information
Emergency Services Functions	LADOTD District Traffic Operations	emergency traffic control request
Emergency Services Functions	LADOTD District Traffic Operations	remote surveillance control
Emergency Services Functions	LADOTD ITS Section 56	emergency traffic control request
Emergency Services Functions	LSP	incident information
Emergency Services Functions	LSP	remote surveillance control
Emergency Services Functions	TMC	emergency traffic control request
Emergency Services Functions	TMC	incident information
Emergency Services Functions	TMC	remote surveillance control
GOHSEP	TMC	emergency traveler information
HAZMAT Mobile Response	LSP	emergency traffic control request
LADOTD District Traffic Operations	Emergency Services Functions	emergency traffic control information
LADOTD District Traffic Operations	Emergency Services Functions	incident information
LADOTD District Traffic Operations	Emergency Services Functions	road network conditions
LADOTD District Traffic Operations	GOHSEP	road network conditions
LADOTD District Traffic Operations	LADOTD ITS Section 56	device control request
LADOTD District Traffic Operations	LADOTD Social Media	road network conditions
LADOTD District Traffic Operations	Louisiana 511 Website	road network conditions
LADOTD District Traffic Operations	TMC	device control request



Source	Destination	Flow
LADOTD District Traffic Operations	TMC	road network conditions
LADOTD ITS Section 56	Emergency Services Functions	emergency traffic control information
LADOTD ITS Section 56	GOHSEP	emergency traffic control information
LADOTD ITS Section 56	GOHSEP	road network conditions
LADOTD ITS Section 56	GOHSEP	road weather information
LADOTD ITS Section 56	LADOTD District Traffic Operations	emergency traffic control information
LADOTD ITS Section 56	LADOTD District Traffic Operations	emergency traffic control request
LADOTD ITS Section 56	LADOTD District Traffic Operations	emergency traffic coordination
LADOTD ITS Section 56	LADOTD Social Media	road network conditions
LADOTD ITS Section 56	LADOTD Social Media	road weather information
LADOTD ITS Section 56	Louisiana 511 Website	road network conditions
LADOTD ITS Section 56	Louisiana 511 Website	road weather information
LADOTD ITS Section 56	TMC	device control request
LADOTD ITS Section 56	TMC	device data
LADOTD ITS Section 56	TMC	device status
LADOTD ITS Section 56	TMC	emergency traffic control information
LADOTD ITS Section 56	TMC	emergency traffic control request
LADOTD ITS Section 56	TMC	emergency traffic coordination
LADOTD ITS Section 56	TMC	environmental conditions data
LADOTD ITS Section 56	TMC	incident information
LADOTD ITS Section 56	TMC	remote surveillance control
LADOTD ITS Section 56	TMC	road network conditions
LADOTD ITS Section 56	TMC	road weather information
LADOTD Social Media	TMC	road network conditions
Local DPW	GOHSEP	emergency traffic control information
Local DPW	GOHSEP	road network conditions
Local DPW	GOHSEP	road weather information
Local DPW	LADOTD District Traffic Operations	emergency traffic coordination
Local DPW	Local Emergency Services	emergency traffic control information
Local DPW	Local Emergency Services	incident information
Local DPW	Local Emergency Services	road network conditions
Local DPW	Local Public Safety Agencies	emergency traffic control information
Local DPW	Local Public Safety Agencies	incident information
Local DPW	Local Public Safety Agencies	road network conditions
Local DPW	LSP	device control request
Local DPW	LSP	device data
Local DPW	LSP	device status
Local DPW	LSP	incident information
Local DPW	LSP	road network conditions
Local DPW	TMC	device control request
Local DPW	TMC	device data
Local DPW	TMC	device status
Local DPW	TMC	emergency traffic control information
Local DPW	TMC	emergency traffic coordination



Source	Destination	Flow
Local DPW	TMC	environmental conditions data
Local DPW	TMC	incident information
Local DPW	TMC	road network conditions
Local DPW	TMC	road weather information
Local Emergency Services	Local DPW	emergency traffic control request
Local Emergency Services	Local DPW	incident information
Local Emergency Services	LSP	emergency traffic control request
Local Emergency Services	LSP	incident information
Local Emergency Services	LSP	remote surveillance control
Local Emergency Services	TMC	emergency traffic control request
Local Emergency Services	TMC	incident information
Local Emergency Services	TMC	remote surveillance control
Local Public Safety Agencies	Local DPW	emergency traffic control request
Local Public Safety Agencies	Local DPW	incident information
Local Public Safety Agencies	Local DPW	remote surveillance control
Local Public Safety Agencies	LSP	emergency traffic control request
Local Public Safety Agencies	LSP	incident information
Local Public Safety Agencies	LSP	remote surveillance control
Local Public Safety Agencies	TMC	emergency traffic control request
Local Public Safety Agencies	TMC	incident information
Local Public Safety Agencies	TMC	remote surveillance control
Louisiana 511 Website	TMC	emergency traveler information
Louisiana 511 Website	TMC	road network conditions
LSP	Emergency 911 Centers	emergency traffic control information
LSP	Emergency 911 Centers	incident information
LSP	Emergency 911 Centers	road network conditions
LSP	Emergency Services Functions	incident information
LSP	Emergency Services Functions	road network conditions
LSP	GOHSEP	emergency traffic control information
LSP	Local DPW	device control request
LSP	Local DPW	device data
LSP	Local DPW	device status
LSP	Local DPW	incident information
LSP	Local DPW	remote surveillance control
LSP	Local DPW	road network conditions
LSP	Local Emergency Services	emergency traffic control information
LSP	Local Emergency Services	incident information
LSP	Local Emergency Services	road network conditions
LSP	Local Public Safety Agencies	emergency traffic control information
LSP	Local Public Safety Agencies	incident information
LSP	Local Public Safety Agencies	road network conditions
LSP	Media	road network conditions
LSP	TMC	device control request
LSP	TMC	device data



Source	Destination	Flow
LSP	TMC	device status
LSP	TMC	emergency traffic control information
LSP	TMC	emergency traffic control request
LSP	TMC	emergency traffic coordination
LSP	TMC	incident information
LSP	TMC	remote surveillance control
LSP	TMC	road network conditions
TMC	Emergency 911 Centers	road network conditions
TMC	Emergency Services Functions	emergency traffic control information
TMC	Emergency Services Functions	incident information
TMC	Emergency Services Functions	road network conditions
TMC	GOHSEP	road network conditions
TMC	LADOTD ITS Section 56	device status
TMC	LADOTD ITS Section 56	road network conditions
TMC	LADOTD Social Media	emergency traveler information
TMC	LADOTD Social Media	road network conditions
TMC	Local DPW	emergency traffic coordination
TMC	Local DPW	road network conditions
TMC	Local Emergency Services	road network conditions
TMC	Local Public Safety Agencies	road network conditions
TMC	Louisiana 511 Website	road network conditions
TMC	LSP	emergency traffic coordination
TMC	LSP	road network conditions
TMC	Ports	road network conditions

US: TOMP - Secure Internet (ITS) Details

Solution Description: This solution is used within the U.S. It combines standards associated with US: TOMP with those for I-I: Secure Internet (ITS). The US: TOMP standards include upper-layer standards required to share information among transport operators. The I-I: Secure Internet (ITS) standards include lower-layer standards that support secure communications between ITS equipment using X.509 or IEEE 1609.2 security certificates.

US: TOMP - Secure Internet (ITS) Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.



Level	Document Number	Title	Description
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
ITS Application Entity	TOMP-API	Transport Operator Mobility-as-a-Service Provider	The TOMP working group aims to develop and sustain an internationally governed interoperable open standard for technical communication between Transport Operators and MaaS Providers, by means of definition, improvement, alignment and dissemination.
Facilities	IETF RFC 7159	The JavaScript Object Notation (JSON) Data Interchange Format	The JavaScript Object Notation (JSON), a lightweight, text-based, language-independent data interchange format. It was derived from the ECMAScript Programming Language Standard. JSON defines a small set of formatting rules for the portable representation of structured data. This document removes inconsistencies with other specifications of JSON, repairs specification errors, and offers experience-based interoperability guidance.
Facilities	IETF RFC 9110	HTTP Semantics	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document describes the overall architecture of HTTP, establishes common terminology, and defines aspects of the protocol that are shared by all versions. In this definition are core protocol elements, extensibility mechanisms, and the "http" and "https" Uniform Resource Identifier (URI) schemes.



Level	Document Number	Title	Description
Facilities	IETF RFC 9112	HTTP/1.1	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document specifies the HTTP/1.1 message syntax, message parsing, connection management, and related security concerns.
TransNet	IETF RFC 4291	IP Version 6 Addressing Architecture	This standard (RFC) defines the addressing architecture of the IP Version 6 (IPv6) protocol. It includes the IPv6 addressing model, text representations of IPv6 addresses, definition of IPv6 unicast addresses, anycast addresses, and multicast addresses, and an IPv6 node's required addresses.
TransNet	IETF RFC 4443	Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification	This standard (RFC) defines the control messages to manage IPv6.
TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).
TransNet	IETF RFC 9293	Transmission Control Protocol	This document specifies the Transmission Control Protocol (TCP). TCP is an important transport-layer protocol in the Internet protocol stack, and it has continuously evolved over decades of use and growth of the Internet. Over this time, a number of changes have been made to TCP as it was specified in RFC 793, though these have only been documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from RFC 793. This document obsoletes RFC 793, as well as RFCs 879, 2873, 6093, 6429, 6528, and 6691 that updated parts of RFC 793. It updates RFCs 1011 and 1122, and it should be considered as a replacement for the portions of those documents dealing with TCP requirements. It also updates RFC 5961 by adding a small clarification in reset handling while in the SYN-RECEIVED state. The TCP header control bits from RFC 793 have also been updated based on RFC 3168.
Access		Internet Subnet Alternatives	A set of alternative standards that includes any Subnet Layer method of connecting to the Internet.

US: TOMP - Secure Internet (ITS) Interfaces

Source	Destination	Flow
Public Transit Services	Louisiana 511 Website	transit and fare schedules
Public Transit Services	Tourism and Travel Service Information Sources	transit and fare schedules

US: TOMP - Secure Wireless Internet (ITS) Details

Solution Description: This solution is used within the U.S. It combines standards associated with US: TOMP with those for I-M: Secure Wireless Internet (ITS). The US: TOMP standards include upper-layer standards required to share information among transport operators. The I-M: Secure Wireless Internet (ITS) standards include lower-layer standards that support secure communications between two entities, either or both of which may be mobile devices, but they must be stationary or only moving within wireless range of a single wireless access point (e.g., a parked car). Security is based on X.509 or IEEE 1609.2 certificates. A non-mobile (if any) endpoint may connect to the service provider using any Internet connection method.



TOMP - Secure Wireless Internet (ITS) Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
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Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
ITS Application Entity	TOMP-API	Transport Operator Mobility-as-a-Service Provider	The TOMP working group aims to develop and sustain an internationally governed interoperable open standard for technical communication between Transport Operators and MaaS Providers, by means of definition, improvement, alignment and dissemination.
Facilities	IETF RFC 7159	The JavaScript Object Notation (JSON) Data Interchange Format	The JavaScript Object Notation (JSON), a lightweight, text-based, language-independent data interchange format. It was derived from the ECMA Script Programming Language Standard. JSON defines a small set of formatting rules for the portable representation of structured data. This document removes inconsistencies with other specifications of JSON, repairs specification errors, and offers experience-based interoperability guidance.



Level	Document Number	Title	Description
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TransNet	IETF RFC 8200	Internet Protocol, Version 6	This document specifies version 6 of the Internet Protocol (IPv6).
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Access	3GPP Network	3GPP Cellular Communications Network	This proxy standard represents a variety of 3GPP releases and underlying standards and technologies that rely upon cellular base stations for connectivity, including 3G, 4G, and the evolving 5G technologies.

TOMP - Secure Wireless Internet (ITS) Interfaces

Source	Destination	Flow
Public Transit Services	Personal Devices	personal transit information
Public Transit Services	Public	personal transit information

US: WAVE Tolling - Local Unicast Wireless (1609.2) Details

Solution Description: This solution is used within the U.S. It combines standards associated with US: WAVE Tolling with those for V-X: Local Unicast Wireless (1609.2). The US: WAVE Tolling standards include upper-layer standards required to implement V2I tolling flows. The V-X: Local Unicast Wireless (1609.2)



standards include lower-layer standards that support local-area unicast wireless solutions applicable to North America, such as WAVE DSRC, LTE-V2X, LTE, Wi-Fi, etc.

US: WAVE Tolling - Local Unicast Wireless (1609.2) Standards

Level	Document Number	Title	Description
Mgmt	Addressed Elsewhere	Addressed Elsewhere in Stack	The services related to this portion of the stack are defined in the other standards listed for this solution.
Security	IEEE 1609.2	IEEE Standard for Wireless Access in Vehicular Environments - Security Services for Applications and Management Messages	This standard defines secure message formats and processing for use by Wireless Access in Vehicular Environments (WAVE) devices, including methods to secure WAVE management messages and methods to secure application messages. It also describes administrative functions necessary to support the core security functions.
Security	IEEE 1609.2a	IEEE 1609.2a-2017 - IEEE Standard for Wireless Access in Vehicular Environments--Security Services for Applications and Management Messages - Amendment 1	This standard defines secure message formats and processing for use by Wireless Access in Vehicular Environments (WAVE) devices, including methods to secure WAVE management messages and methods to secure application messages. It also describes administrative functions necessary to support the core security functions.
Security	IEEE 1609.2b	IEEE Standard for Wireless Access in Vehicular Environments--Security Services for Applications and Management Messages - Amendment 2--PDU Functional Types and Encryption Key Management	This standard defines secure message formats and processing for use by Wireless Access in Vehicular Environments (WAVE) devices, including methods to secure WAVE management messages and methods to secure application messages. It also describes administrative functions necessary to support the core security functions.
ITS Application Entity	ISO 14906	Electronic fee collection -- Application interface definition for dedicated short-range communication	ISO 14906 specifies the application interface in the context of electronic fee collection (EFC) systems using the dedicated short-range communication (DSRC).
Facilities	IEEE 1609.11	IEEE Standard for Wireless Access in Vehicular Environments (WAVE)-- Over-the-Air Electronic Payment Data Exchange Protocol for Intelligent Transportation Systems (ITS)	This standard defines a basic level of technical interoperability for an over-the-air electronic payment (e.g., tolling) protocol for the vehicle-to-roadside link for electronic payment equipment. It does not provide a full solution for interoperability, and it does not define other parts of the electronic payment system, other services, other technologies and non-technical elements of payment interoperability.
Facilities	ISO 15628	Intelligent transport systems -- Dedicated short range communication (DSRC) -- DSRC application layer	ISO 15628 specifies the upper layers originally developed for EU 5.8 GHz backscatter communications, and US DSRC. Likely not very relevant for C-ITS. Application identifier is continued now as part of EN ISO 17419 ITS-AID.
TransNet	IEEE 1609.3	IEEE Standard for Wireless Access in Vehicular Environments (WAVE) - Networking Services	This standard defines the network and transport layer options for the WAVE environment. The standard defines three options: a bandwidth efficient single-hop solution known as WSMP, UDP/IP, and TCP/IP. It has been harmonized with ISO FNTF and FSAP - a common message format specified in ISO 16460.
Access	IEEE 802.11	IEEE Draft Standard for Information technology--Telecommunications and information exchange between systems Local and metropolitan area networks--Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specificatio	This standard defines the physical and data link layers for wireless Ethernet, including WiFi and DSRC.



US: WAVE Tolling - Local Unicast Wireless (1609.2) Interfaces

Source	Destination	Flow
Commercial Vehicles	Toll Plaza	vehicle payment information
Toll Plaza	Commercial Vehicles	vehicle payment update

US: WZDx - Guaranteed Secure Internet (ITS) Details

Solution Description: This solution is used within the U.S. It combines standards associated with US: WZDx with those for I-I: Guaranteed Secure Internet (ITS). The US: WZDx standards include upper-layer standards required to implement work zone information data exchanges. The I-I: Guaranteed Secure Internet (ITS) standards include lower-layer standards that support secure communications with guaranteed delivery between ITS equipment using X.509 or IEEE 1609.2 security certificates.

US: WZDx - Guaranteed Secure Internet (ITS) Standards

Level	Document Number	Title	Description
Mgmt	IETF RFC 3411	An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks	This standard (RFC) defines the basic architecture for SNMPv3 and includes the definition of information objects for managing the SNMP entity's architecture.
Mgmt	IETF RFC 3412	Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that assists in managing the message processing and dispatching subsystem of an SNMP entity.
Mgmt	IETF RFC 3413	Simple Network Management Protocol (SNMP) Applications	This standard (RFC) includes MIBs that allow for the configuration and management of remote Targets, Notifications, and Proxys.
Mgmt	IETF RFC 3414	User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)	This standard (RFC) contains a MIB that assists in configuring and managing the user-based security model.
Mgmt	IETF RFC 3415	View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	This standard (RFC) contains a MIB that supports the configuration and management of the View-based access control model of SNMP.
Mgmt	IETF RFC 3416	Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the message structure and protocol operations used by SNMPv3.
Mgmt	IETF RFC 3418	Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)	This standard (RFC) defines the MIB to configure and manage an SNMP entity.



Level	Document Number	Title	Description
Mgmt	IETF RFC 4293	Management Information Base for the Internet Protocol (IP)	This standard (RFC) defines the MIB that manages an IP entity.
Security	IETF RFC 5280	Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	This standard (RFC) defines how to use X.509 certificates for secure communications over the Internet.
Security	IETF RFC 8446	The Transport Layer Security (TLS) Protocol	This standard (RFC) specifies Version 1.3 of the Transport Layer Security (TLS) protocol. The TLS protocol provides communications security over the Internet. The protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery.
ITS Application Entity	WZDx	Work Zone Data Exchange	This standard defines a common format for exchanging work zone information.
Facilities	IETF RFC 9110	HTTP Semantics	The Hypertext Transfer Protocol (HTTP) is a stateless application-level protocol for distributed, collaborative, hypertext information systems. This document describes the overall architecture of HTTP, establishes common terminology, and defines aspects of the protocol that are shared by all versions. In this definition are core protocol elements, extensibility mechanisms, and the "http" and "https" Uniform Resource Identifier (URI) schemes.
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Access		Internet Subnet Alternatives	A set of alternative standards that includes any Subnet Layer method of connecting to the Internet.



US: WZDx - Guaranteed Secure Internet (ITS) Interfaces

Source	Destination	Flow
LADOTD ITS Section 56	LADOTD Social Media	current infrastructure restrictions
LADOTD ITS Section 56	LADOTD Social Media	maint and constr work plans
LADOTD ITS Section 56	Louisiana 511 Website	current infrastructure restrictions
LADOTD ITS Section 56	Louisiana 511 Website	maint and constr work plans
LADOTD ITS Section 56	TMC	current infrastructure restrictions
LADOTD ITS Section 56	TMC	maint and constr work plans
Local DPW	Emergency Services Functions	current infrastructure restrictions
Local DPW	Emergency Services Functions	maint and constr work plans
Local DPW	GOHSEP	current infrastructure restrictions
Local DPW	Local Emergency Services	current infrastructure restrictions
Local DPW	Local Emergency Services	maint and constr work plans
Local DPW	Local Public Safety Agencies	current infrastructure restrictions
Local DPW	Local Public Safety Agencies	maint and constr work plans
Local DPW	LSP	current infrastructure restrictions
Local DPW	LSP	maint and constr work plans
Local DPW	Public Transit Services	maint and constr work plans
Local DPW	TMC	current infrastructure restrictions
Local DPW	TMC	maint and constr work plans

US: WZDx - Secure Internet (ITS) Details

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US: WZDx - Secure Internet (ITS) Interfaces

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LADOTD ITS Section 56	Louisiana 511 Website	work zone information
LADOTD ITS Section 56	TMC	work zone information
Local DPW	Emergency Services Functions	work zone information
Local DPW	Local Emergency Services	work zone information
Local DPW	Local Public Safety Agencies	work zone information
Local DPW	LSP	work zone information
Local DPW	Public Transit Services	work zone information
Local DPW	TMC	work zone information



APPENDIX F AGREEMENTS

VIDEO SHARING AGREEMENT (TYPICAL)



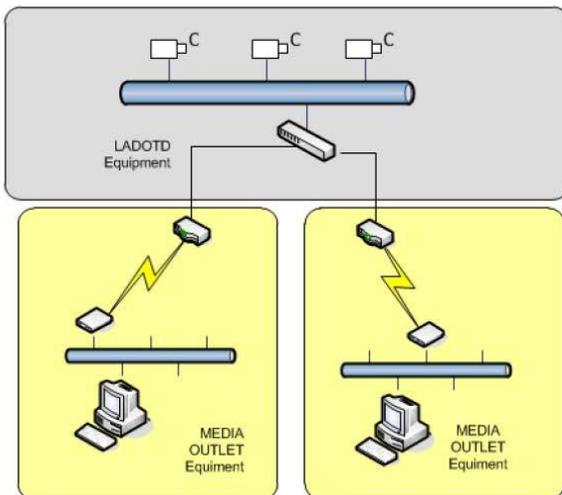
Louisiana Department of Transportation and Development

Traffic Video Sharing Network Plan, Equipment Requirements and Support
High Bandwidth Connection
9/13/2010

Video Sharing Concept:

LADOTD, through a Cooperative Endeavor Agreement with a MEDIA OUTLET, agrees to provide non-exclusive access to the LADOTD Traffic Camera Network. This will provide the MEDIA OUTLET access to all multi-cast video that is available at the Point of Presence (POP) where the MEDIA OUTLET gains access to the LADOTD network. These POP locations will typically be located within LADOTD facilities where the ITS network can be readily accessed (i.e. Regional or Statewide Transportation Management Centers that currently access the backbone Traffic Camera Network). The MEDIA OUTLET will be responsible for arranging the installation and on-going expense associated with the needed telecommunication services and equipment to transport the Traffic Camera Network video signal to their studios for further processing that is required to make the video suitable for broadcasting on TV. The MEDIA OUTLET will also be responsible for any equipment and/or software that are required to decode the digital video into a signal that is suitable for broadcasting on TV. LADOTD will make reasonable space accommodations to the MEDIA OUTLET for any equipment that will need to be installed at the LADOTD POP.

Network Connection Diagram:



MEDIA OUTLET Network Capacity, Hardware and Software Requirements:

- 100 mb dedicated link from POP to MEDIA OUTLET facility capable of IP multicast transport (standard MPLS service does NOT meet this requirement). Actual bandwidth requirements will vary depending on the number of concurrently viewed cameras and cycle times. (specify any required details)
- Network Router capable of Multicast routing, suggested 1Gigabit Ethernet port for connection to DOTD in addition to the interface appropriate for the WAN link above (specify make and model)
- PC capable of decoding Traffic Camera video feeds to analog
- Teleste VMX Viewer software to decode Traffic Camera video feeds

Support Responsibilities of LADOTD:

- LADOTD will be responsible for configuration guidance for the Network Router provided by the MEDIA OUTLET.
- LADOTD will be responsible for configuring any and all network equipment owned by LADOTD that is required to complete the connection to the MEDIA OUTLET.
- LADOTD will be responsible for maintaining the network connection between the LADOTD owned network equipment and the MEDIA OUTLET provided network equipment.
- LADOTD will provide MEDIA OUTLET with a list of all IP addresses of the multi-cast Traffic Cameras that are accessible from the POP where the MEDIA OUTLET gains access to the LADOTD Traffic Camera Network.

Support Responsibilities of MEDIA OUTLET (will begin once the connection to the MEDIA OUTLET is completed and accepted by both LADOTD and the MEDIA OUTLET):

- The MEDIA OUTLET will be responsible for maintaining and troubleshooting any problems associated with the network equipment provided by the MEDIA OUTLET.
- The MEDIA OUTLET will be responsible for troubleshooting and supporting the network services installed between the LADOTD POP and the MEDIA OUTLET.
- The MEDIA OUTLET will be responsible for the PC equipment and all software being used to decode the video at the MEDIA OUTLET.



**COOPERATIVE ENDEAVOR AGREEMENT
VIDEO SHARING
between
THE STATE OF LOUISIANA
through the
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
and
LOUISIANA TELEVISION BROADCASTING, L.L.C.**

This Agreement is made and entered into this 1st day of June, 2014, by and between the Louisiana Department of Transportation and Development (hereinafter referred to as "LADOTD") whose principal place of business is 1201 Capital Access Road, Baton Rouge, Louisiana, 70804 and Louisiana Television Broadcasting, L.L.C., hereinafter referred to as "MEDIA OUTLET" whose principal place of business is 1650 Highland Rd, Baton Rouge, Louisiana, 70802.

WHEREAS, Article VII, Section 14(C) of the Constitution of the State of Louisiana provides, in pertinent part, that "For a public purpose, the state . . . may engage in cooperative endeavors with . . . any public or private association, corporation or individual"; and

WHEREAS, LADOTD wishes to cooperate with the MEDIA OUTLET in the manner as hereinafter provided; and

WHEREAS, consistent with the statutory purposes contained in Title 48 of the Louisiana Revised Statutes of 1950, LADOTD monitors traffic and roadway conditions on and around state highway systems for use in promoting highway safety and relieving highway congestion; and

WHEREAS, LADOTD, through its Advanced Traffic Management System (ATMS)DOTD STATEWIDE TMC, LADOTD operates closed circuit cameras on certain portions of Interstate, US Routes and Louisiana State Highways throughout the state of Louisiana("camera systems") capable of producing real-time traffic video images ("video images"); and

WHEREAS, in furtherance of its statutory purposes, LADOTD routinely provides television stations with information related to traffic and roadway conditions, road closures and construction activity for broadcast to the general public. LADOTD and MEDIA OUTLET wish to enhance the quality of this information by providing MEDIA OUTLET with access to LADOTD's video images; and

WHEREAS, MEDIA OUTLET has expressed a desire to access the Video Images to broadcast traffic information to MEDIA OUTLET's viewers as well as posting same on the MEDIA OUTLET's website. MEDIA OUTLET intends to use the Video Images for traffic and news reporting of events, both live and video tape, when warranted; and



WHEREAS, the actions of LADOTD and MEDIA OUTLET will promote highway safety by enhancing the quality and availability of information disseminated to the general public and the motoring public relative to current traffic and roadway conditions in and throughout the State of Louisiana.

NOW THEREFORE, in consideration of the mutual covenants contained herein, the lawful purposes; the public purpose; and the public benefit the parties hereto agree as follows:

ARTICLE I SCOPE OF SERVICES

- 1.1** LADOTD agrees to provide MEDIA OUTLET with video images generated by LADOTD's Camera Systems, without charge. LADOTD ATMS Operations personnel shall have exclusive authority to determine the camera view supplied by each of its cameras.
- 1.2** MEDIA OUTLET will, at its expense, provide and install all necessary equipment (telephone line, hardware and/or software) at the DOTD STATEWIDE TMC, to access the video feed or seek partnerships with existing media outlets to access the video feed under a negotiated business model.
- 1.3** LADOTD agrees to provide MEDIA OUTLET with reasonable accommodations within the DOTD STATEWIDE TMC facility to install its equipment. LADOTD will also provide MEDIA OUTLET with reasonable access to service its equipment and MEDIA OUTLET will maintain its equipment throughout the term of this Agreement.
- 1.4** LADOTD will provide MEDIA OUTLET with a user name and password to access the LADOTD Media Page. MEDIA OUTLET will be allowed 3 simultaneous sessions to the Media Page per user account. MEDIA OUTLET agrees to keep the user name and password to the Media Page confidential for use only by the Media Outlet.
- 1.5** LADOTD reserves the right to modify, alter, replace, improve and upgrade its equipment and to relocate its operations at any time. In the event LADOTD chooses to exercise this right, MEDIA OUTLET shall, at its own expense, relocate and make the necessary replacements and modifications to its equipment as is necessary to accommodate LADOTD's changes.
- 1.6** MEDIA OUTLET shall have the right to upgrade its equipment as technology becomes available; provided, however, that installation is at a time convenient to LADOTD; installation does not interfere with LADOTD's operations; and MEDIA OUTLET provides LADOTD with a network diagram, description and basic operations capability of the equipment prior to its installation.
- 1.7** MEDIA OUTLET shall remove its equipment from the DOTD STATEWIDE TMC facility within thirty (30) days after termination or expiration of this Agreement.



1.8 MEDIA OUTLET agrees to timely and accurately broadcast, transmit and post the video images. MEDIA OUTLET is prohibited from making any misrepresentations relative to the video images, including but not limited to, the actual time, date and location of each video image. MEDIA OUTLET further agrees to visibly display LADOTD's logo during all broadcasts and transmissions and will appropriately credit LADOTD on its website postings in which the video images are used. This logo will be inserted in such a way as to not interfere with the visual content of the image being transmitted.

1.9 MEDIA OUTLET shall provide LADOTD with the name and telephone number of a person within MEDIA OUTLET's organization with the technical skills necessary to address any concerns LADOTD may have and to resolve problems associated with the performance of this Agreement.

1.10 MEDIA OUTLET shall protect the integrity of the Camera System and Video Images by insuring that its reporters and other personnel disseminating information relative to the Video Images possess the knowledge and skills necessary to accurately convey and interpret the information contained in the Video Images. MEDIA OUTLET further agrees to meet with LADOTD on a bi-annual basis to review policies and procedures relative to this Agreement.

1.11 MEDIA OUTLET understands and agrees that the services provided by LADOTD pursuant to this agreement may be interrupted or discontinued for any number of reasons, including but not limited to, equipment malfunctions and repairs, routine maintenance, personnel and funding shortages and ongoing responses to emergency situations. If services are discontinued or if interruptions occur, LADOTD shall not be responsible for providing MEDIA OUTLET with traffic information from any other source nor shall LADOTD be responsible to MEDIA OUTLET for any losses, damages or inconveniences occasioned by MEDIA OUTLET as a result of the interruption or discontinuation of the service.

1.12 MEDIA OUTLET understands that there may be instances when the video images contain graphic depictions of accidents, accident scenes and accident victims. MEDIA OUTLET agrees, whenever possible, to refrain from transmitting, broadcasting, posting on its website or otherwise publishing any video image that may unduly offend, humiliate or cause undue embarrassment to accident victims or their families. Examples of such images would include dead bodies, nudity, exposed undergarments, open wounds, broken bones, the administration of medical treatment and the faces or any other item that could be used to determine the identity of a minor or an accident victim whose family has not yet been notified by appropriate government officials of the accident. LADOTD understands that many of the broadcasts and transmissions will be live leaving MEDIA OUTLET with no opportunity to edit the content.

1.13 MEDIA OUTLET further understands and agrees that, although the ATMS and DOTD STATEWIDE TMC are currently in continuous operation, LADOTD may, at any time and for any reason, reduce or change its hours of operation. If this occurs, LADOTD will make reasonable efforts to notify MEDIA OUTLET in advance of the changes or reduction in its hours of operation.



1.14 MEDIA OUTLET shall insure that the Camera System and Video Images and any other information connected with the performance of this Agreement are used only for the specific purpose stated herein. MEDIA OUTLET agrees not to duplicate, reproduce, sell, or charge a fee for use of the Video Images by others. However, MEDIA OUTLET may charge the costs associated with duplication or reproduction of Video Images produced pursuant to a valid subpoena or court order.

1.15 MEDIA OUTLET understands and agrees that it enjoys a non-exclusive limited right to use the Video Images and agrees not to misrepresent the source or availability of the Video Images to others. MEDIA OUTLET further understands that it is LADOTD's intent to provide other media outlets ("Users") access to its Video Images and desires to do so in a manner that is least disruptive to LADOTD's operations and minimizes the space needed to accommodate User's equipment. In this regard, MEDIA OUTLET agrees to allow any User contracting with LADOTD to tie into MEDIA OUTLET's video distribution amplifier to the extent the video distribution amplifier is capable and for as long as MEDIA OUTLET's video distribution amplifier is housed in the DOTD STATEWIDE TMC facility. MEDIA OUTLET may charge any such User a proportionate share of the maintenance costs.

1.16 Nothing herein shall prevent MEDIA OUTLET from selling sponsorships to its traffic and news segments within its newscasts and website in the normal course of business. However, no advertiser or sponsor content may be superimposed or otherwise displayed on the visual content of the image being transmitted. Nothing herein will prevent MEDIA OUTLET from duplicating or videotaping newscasts containing the Video Images for re-broadcasts, provided that the date, time and location of the Video Image are not misrepresented.

ARTICLE II TERM OF AGREEMENT

2.1 The term of this agreement shall be 5 years (FIVE YEAR TERM).

2.2 Notwithstanding any other provision to the contrary, this Agreement is contingent upon MEDIA OUTLET providing LADOTD with a network diagram, description and basic operations capability of all equipment that will be tied to or in any way connected to LADOTD's DOTD STATEWIDE TMC.

ARTICLE III TAXES

3.1 If applicable, MEDIA OUTLET hereby agrees that the responsibility for payment of taxes for services provide in this Agreement shall be MEDIA OUTLET's obligation and identified under Federal tax identification number 72-0464654.



**ARTICLE IV
TERMINATION CLAUSE**

4.1 The LADOTD may terminate this Agreement for cause based on the failure of the MEDIA OUTLET to comply with the terms and/or conditions of the Agreement provided that the LADOTD shall give the MEDIA OUTLET written notice specifying MEDIA OUTLET's failure. If within thirty (30) days after receipt of such notice, the MEDIA OUTLET shall not have either corrected such failure or thereafter proceeded diligently to complete such correction, then the LADOTD may, at its option, place the MEDIA OUTLET in default and the Agreement shall terminate on the date specified in such notice. The MEDIA OUTLET may exercise any rights available to it under Louisiana law to terminate for cause upon the failure of the LADOTD to comply with the terms and conditions of this Agreement; provided that the MEDIA OUTLET shall give the LADOTD written notice specifying the LADOTD's failure and reasonable opportunity for the LADOTD to cure the defect.

**ARTICLE V
TERMINATION FOR CONVENIENCE**

5.1 The LADOTD, or MEDIA OUTLET, may terminate the Agreement at any time by giving thirty (30) days written notice to the other party.

**ARTICLE VI
OWNERSHIP**

6.1 Any records, reports, documents and other material delivered or transmitted to MEDIA OUTLET by LADOTD shall remain the property of LADOTD, and shall be returned by the MEDIA OUTLET to LADOTD at MEDIA OUTLET's expense, at termination or expiration of this Agreement. Any records, reports, documents, or other material related to this Agreement and/or obtained or prepared by MEDIA OUTLET in connection with the performance of the services contracted for herein shall become the property of LADOTD, and shall, upon request, be returned by MEDIA OUTLET to the LADOTD, at MEDIA OUTLET's expense, at termination or expiration of this Agreement.

**ARTICLE VII
NON-ASSIGNABLE**

7.1 MEDIA OUTLET shall not assign any interest in this Agreement by assignment, transfer, donation or novation, without prior written consent of the LADOTD. This provision shall not be construed to prohibit the MEDIA OUTLET from assigning his bank, trust company, or other financial institution any money due or to become due from approved agreements or contracts without such prior written consent. Notice of any such assignment or transfer shall be furnished promptly to the LADTOD and the Office of Contractual Review.



**ARTICLE VIII
AUDITORS CLAUSE**

8.1 MEDIA OUTLET will comply with all applicable laws, rules and regulations, including but not limited to LSA-R.S. 39:1622. Each party acknowledges that it may receive confidential information from the other party in connection with this agreement. Each party agrees that it will not disclose, provide or otherwise make available any such Confidential Information to any person and/or entity other than such party's employees and/or consultants who need to have access thereto carry out their duties and who are under an obligation to keep such information confidential. Any such books and records required to fulfill this requirement must be maintained for a period of five years from the date of termination of this Agreement.

**ARTICLE IX
FISCAL FUNDING**

9.1 The continuation of this Agreement is contingent upon the appropriation of funds to fulfill the requirements of the Agreement by the Legislature. If the Legislature fails to appropriate sufficient monies to provide for the continuation of the Agreement, or if such appropriation is reduced by the veto of the Governor or by any means provided in the appropriations act to prevent the total appropriation for the year from exceeding revenues for that year, or for any other lawful purpose, and the effect of such reduction is to provide insufficient monies for the continuation of the Agreement, the Agreement shall terminate on the date of the beginning of the first fiscal year for which funds are not appropriated.

**ARTICLE X
INDEMNIFICATION - INSURANCE - LIABILITY**

10.1 LADOTD does not guarantee continuity of the services provided for in this agreement nor does LADOTD guarantee the accuracy of the information provided. Any reliance on said information or services, or both, shall be solely at the risk of MEDIA OUTLET.

10.2 MEDIA OUTLET hereby agrees to indemnify and save harmless LADOTD, its officers, agents, employees and assigns, against any and all claims, losses, liabilities, demands, suits, causes of action, damages, and judgments of sums of money to any party accruing against the LADOTD growing out of, resulting from, or by reason of any act or omission of MEDIA OUTLET, its agents, servants, independent contractors, or employees while engaged in, about, or in connection with the discharge or performance of the terms of this agreement. Such indemnification shall include the LADOTD's fees and costs of litigation, including, but not limited to, reasonable attorney's fees. MEDIA OUTLET shall provide and bear the expense of all personal and professional insurance related to its duties arising under this Agreement.



**ARTICLE XI
DISCRIMINATION CLAUSE**

11.1 The MEDIA OUTLET agrees to abide by the requirements of the following as applicable: Title VI of the Civil Rights Act of 1964 and Title VII of the Civil Rights Act of 1964, as amended by the Equal Employment Opportunity Act of 1972, Federal Executive Order 11246 as amended, the Rehabilitation Act of 1973, as amended, the Vietnam Era Veteran's Readjustment Assistance Act of 1974, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1975, the Fair Housing Act of 1968 as amended, and contractor agrees to abide by the requirements of the Americans with Disabilities Act of 1990.

11.2 MEDIA OUTLET agrees not to discriminate in its employment practices, and will render services under the Agreement without regard to race, color, religion, sex, national origin, veteran status, political affiliation, disabilities.

11.3 Any act of discrimination committed by MEDIA OUTLET, or failure to comply with these statutory obligations when applicable shall be grounds for termination of this Agreement.

**ARTICLE XII
PARTIAL INVALIDITY; SEVERABILITY**

12.1 If any term, covenant, condition, or provision of the Agreement or the application thereof to any person or circumstances shall, at any time or to any extent, be invalid or unenforceable, the remainder of the Agreement, or the application of such term, covenant, condition or provision to persons or circumstances other than those as to which it is held invalid or unenforceable, shall not be affected thereby, and each term, covenant, condition, and provision of the Agreement shall be valid and be enforced to the fullest extent permitted by law.

**ARTICLE XIII
ENTIRE AGREEMENT; MODIFICATION**

13.1 This Agreement, including any attachments that are expressly referred to in this Agreement, contains the entire agreement between the parties and supersedes any and all agreement or contracts previously entered into between the parties. No representations were made or relied upon by either party, other than those that are expressly set forth. This Agreement may be modified or amended at any time by mutual consent of the parties, provided that, before any modification or amendment shall be operative and valid, it shall be reduced to writing and signed by both parties.

**ARTICLE XIV
CONTROLLING LAW**

14.1 The validity, interpretation, and performance of this Agreement shall be controlled by and



construed in accordance with the laws of the State of Louisiana.

**ARTICLE XV
LEGAL COMPLIANCE**

15.1 MEDIA OUTLET shall comply with all federal, state, and local laws and regulations, including, specifically, the Louisiana Code of Governmental Ethics (LSA-R.S. 42:1101, et seq.) in carrying out the provisions of this Agreement.

**ARTICLE XVI
REMEDIES FOR DEFAULT**

16.1 In the event of default by either party, the aggrieved party shall have all right granted by the general laws of the State of Louisiana.



IN WITNESS THEREOF, the parties have caused these presents to be executed by their respective officers thereunto duly authorized as of the day and year first above written.

WITNESSES:

Jallas Dunn
Johette B. Normile

MEDIA OUTLET

BY: [Signature]
RICHARD F. MARSH
Typed or Printed Name

TITLE: PRESIDENT + CEO

72-0464654
Federal Identification Number

WITNESSES

Geoffrey Rodriguez
Darlene Majed

**STATE OF LOUISIANA
THROUGH THE DEPARTMENT OF
TRANSPORTATION AND
DEVELOPMENT**

BY: [Signature]
for Secretary

RECOMMENDED FOR APPROVAL:

BY: [Signature]
Division Head



Stakeholders with Video Sharing Agreement

	<u>Company Name</u>	<u>Region</u>	<u>Media Page Acct</u>	<u>Media Page Network</u>	<u>Agr. #</u>	<u>Initial Date</u>	<u>Start Date</u>	<u>Expiration Date</u>	<u>Comments</u>
1	Total Traffic Network	Statewide	y	y	2	2/4/2015	8/31/2020	8/30/2025	
2	Knight Broadcasting of Baton Rouge - WVLA	Baton Rouge/Statewide	y	y	2	5/24/2011	4/20/2021	4/19/2026	Shares circuit with WGMB
3	Nexstar of Louisiana - WGMB/KADN	Baton Rouge/Statewide	y	y	2	5/24/2011	4/20/2021	4/19/2026	
4	KTAL	Shreveport	y	y	2	8/1/2008	5/24/2021	5/23/2026	
5	WBRZ	Baton Rouge/Statewide	y	y	2	9/30/2005	5/24/2021	5/23/2026	
6	WAFB	Baton Rouge/Statewide	y	y	2	6/9/2005	5/24/2021	5/23/2026	
7	WWL TV	New Orleans	y	y	2	9/9/2011	8/27/2021	8/26/2026	
8	WVUE	New Orleans	y	y	2	3/29/2010	1/21/2022	1/20/2027	
9	Lafayette 911	Lafayette			1	2/24/2022	2/24/2022	2/23/2027	
10	City of Shreveport	Shreveport			1	5/6/2022	5/6/2022	5/5/2027	
11	Louisiana State Police (LSP)	Statewide			1	8/26/2022	8/26/2022	8/25/2027	
12	JPSO	New Orleans			2	2/21/2013	7/10/2023	7/9/2028	
13	KTBS	Shreveport	y	y	2	9/23/2010	8/28/2023	8/27/2028	
14	WDSU	New Orleans	y	y	1	6/13/2013	8/7/2018	8/6/2023	
15	KSLA	Shreveport			1	1/25/2008	11/1/2018	10/31/2023	
16	Trafficland	Statewide			1	3/28/2008	9/16/2019	9/15/2024	

