Intelligent Transportation Systems (ITS)
Commercial Vehicle Operations (CVO)

Commercial Vehicle Information Systems and Networks (CVISN) Architecture

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Internal and external reviews of this document, previously published drafts, and preliminary versions have been completed. All comments received to date have been incorporated or addressed.

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Note: This document and other CVISN-related documentation are available for review and downloading by the ITS/CVO community from the FMCSA CVISN site on the World Wide Web. The URL for the CVISN site is: http://www.fmcsa.dot.gov/facts-research/cvisn.

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CVISN Architecture

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1. INTRODUCTION

1.1 Background

This document establishes a new baseline for the Commercial Vehicle Information Systems and Networks (CVISN) Architecture. The CVISN Architecture baseline was aligned with the National Intelligent Transportation Systems (ITS) and International Border Clearance (IBC) Architectures in 2001–2002 (References [1], [2], and [3]). The CVISN Architecture was subsequently revised to align with Version 5.0 (Reference [4]) and with Versions 5.1 and 5.1.1 of the National ITS Architecture (Reference [5]). Version 3.0 of the CVISN Architecture (the previous version of this document) provided additional support for Expanded CVISN concepts; the National ITS Architecture caught up with those changes in their Version 6.0. This current version of the CVISN Architecture reflects alignment with Versions 6.0 and 6.1 of the National ITS Architecture – this includes updates for Expanded CVISN, the Border Information Flow Architecture (BIFA), and the Vehicle Infrastructure Integration (VII). The CVISN Architecture uses terminology and components that the National ITS Architecture uses.

1.2 Scope

CVISN represents a subset of the National ITS Architecture, http://www.iteris.com/itsarch/, Reference [6]. CVISN comprises the information systems and networks that support commercial vehicle operations (CVO).

Two diagrams that depict subsystems, equipment packages, architecture flows, and terminators represent the CVISN Architecture [Figures 2–2 and 2–3]. Tables in this document provide additional information about each item shown on the diagram. The architecture reflects the vision for CVISN over the next few years.

The latest version of the CVISN Operational and Architectural Compatibility Handbook (COACH) Part 1 included a simplified overview of Core CVISN capabilities – that material used to be Appendix A in this document. The new Appendix A lists the 40 priority Expanded CVISN capabilities that stakeholders identified in 2004–2005. For details about Core and Expanded CVISN capabilities and requirements, the reader should review the COACH Part 1 (Reference [7]). The COACH provides a comprehensive checklist of what is required to conform to the CVISN operational concepts, architecture, and design.

The CVISN Architecture recommends that the stakeholder community adopt and use standard primary identifiers for carrier, vehicle, transponder, driver, shipment, and international trip in all data exchanges. Appendix B shows the recommended identifiers.

1.3 Maintaining the CVISN Architecture

The CVISN Architecture is under configuration management. There is a three-tier process for proposing a change to the architecture. First, the proposed change will be presented to and reviewed by the CVISN Architecture Configuration Control Board (ACCB). The ACCB is made up of FMCSA and state representatives and is staffed by The Johns Hopkins University Applied Physics Laboratory (JHU/APL). Change Requests (CRs) are reviewed in regular (monthly) meetings. Once the ACCB has reached consensus about a proposed change that may also impact the National ITS Architecture, the CR recommended for approval will be discussed with the National ITS Architecture team. If the National ITS Architecture team concurs, in the final stage of the process, the proposed change will be presented to FMCSA for consideration. If FMCSA approves the proposed change, it will be implemented in CVISN. At the next release, it will be implemented in the National ITS Architecture.

If a new user service requires that CVO-related functions be added to the National ITS Architecture, then existing components may need to be changed or other components added. The CVISN Architecture team will work with the National ITS Architecture team to develop the proposed changes to the architecture, and then go through the CR process with the CVISN ACCB.

Chapter 3 lists the change requests that are incorporated in this version of the CVISN Architecture. In Chapter 2, impacted rows are flagged with the change request number(s) (CR #).

2. CVISN ARCHITECTURE

The CVISN Architecture reflects alignment with the National ITS Architecture using these ground rules:

- The elements of the physical architecture (subsystems, equipment packages, terminators, and architecture flows) are aligned. The logical architectures were not aligned as part of this process.
- The scope includes Core and Expanded CVISN functions plus toll, international border crossing, other safety functions, and CVO security. This particular version of the CVISN Architecture document reflects the alignment with Versions 6.0 and 6.1 of the National ITS Architecture and modifications to support Expanded CVISN capabilities.
- Human terminators, except the Commercial Vehicle (CV) Driver and the generic vehicle Driver, are not part of the alignment.

Figure 2–1 is based on the National ITS Architecture Interconnect Diagram (“sausage” diagram). It highlights the components of the National ITS Architecture that are relevant to the unique components of commercial vehicle operations.

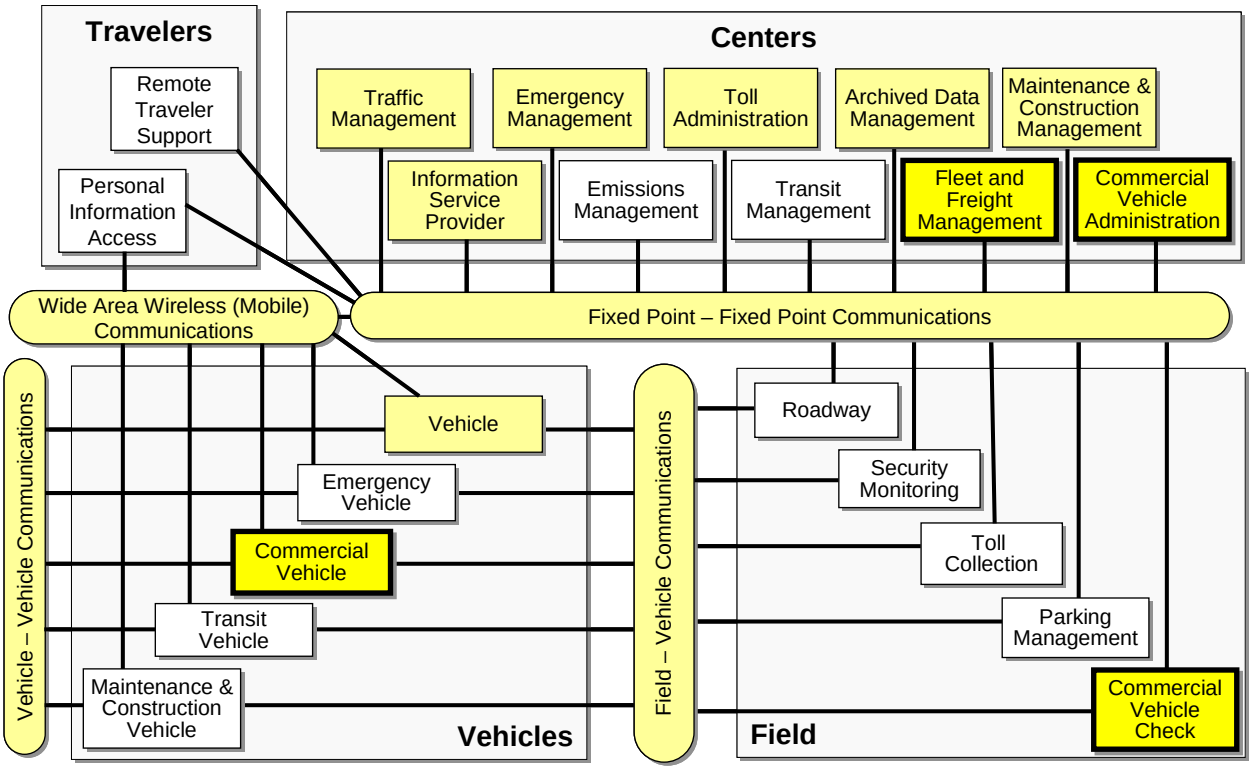

Figure 2–1: CVO Subsystems in the National ITS Architecture

The ITS subsystems communicate with each other using the communication elements and architecture interconnect channels shown in the National ITS Architecture Interconnect Diagram. The subsystems are shown as boxes, the communications channels are shown as lines, and the communication elements are shown as "sausages." In this version of the drawing, elements unique to CVO are shown with thick borders, and those that interface with the CVO-unique elements are shaded.

The subsystems shown as single entities are representative of multiple instances of the specific subsystems. For example, several Commercial Vehicle Administration subsystems in a region, each with their own jurisdiction, may communicate with each other.

2.1 Architecture Conventions

This document uses terminology from the National ITS Architecture as follows:

- Subsystem – The principle structural element of the physical architecture view. Subsystems are grouped into four classes (centers, field, vehicles, and travelers).
- Equipment package – Equipment packages are the building blocks of the physical architecture subsystems. Equipment packages group similar processes of a particular subsystem into an "implementable" package.

- Terminator – Terminators define the boundary of the architecture. The National ITS Architecture terminators represent the people, systems, and general environment that interface to ITS.
- Architecture flow – Information that is exchanged between subsystems and terminators in the physical architecture view.

The CVISN Architecture follows these conventions for naming, styles, etc.:

1. CVISN uses the National ITS Architecture naming conventions for aligned architecture flows: flow names are lower case except for acronyms. Some acronyms (e.g., cv for Commercial Vehicle) used in architecture flow names are also in lower case.
2. CVISN uses the National ITS Architecture definitions for aligned subsystems, equipment packages, terminators, and architecture flows.
3. In this version of the architecture, CVISN follows for the first time the National ITS Architecture's approach and maintains the distinction between the (general) Vehicle Subsystem and the Commercial Vehicle Subsystem.
4. The line types used on the CVISN flow diagrams to reflect "architecture interconnects" are as follows:
    a. Fixed Point – Fixed Point Communications or Wide Area Wireless (Mobile) Communications: shown as a solid line
    b. Field – Vehicle Communications (called Dedicated Short Range Communications in prior versions): shown as a dashed line
    c. Vehicle – Vehicle Communications: shown as a line with a long dash followed by a single dot
    d. Human Interface: shown as a line with a long dash followed by two dots
    e. Other Transactions – shown as a dotted line

    The Field – Vehicle Communications architecture flow types used by CVISN match those defined by the National ITS Architecture. CVISN makes no distinction between fixed point and wireless wide area communications.
5. Some architecture flows between humans and subsystems remain in the National ITS Architecture but are not shown in the CVISN Architecture; the human operator is considered to be part of the subsystem in CVISN. The exceptions are the Commercial Vehicle Driver and the generic vehicle Driver.

2.2 Architecture Flow Diagram

Figure 2–2 is the CVISN Architecture Flow Diagram. The CVISN Architecture Flow Diagram depicts the CVO data flow among subsystems and between CVO subsystems and external entities. The subsystems and equipment packages shown relate to the processes defined in the National ITS Architecture's Physical Architecture. The shaded equipment packages are not part of Core CVISN. Table 2 shows which equipment packages exchange architecture flows.

Entities external to the ITS information systems are shown in ovals. In National Architecture terminology, these are "terminators."

Version 6.0 of the National ITS Architecture included major updates to align with the Vehicle Infrastructure Integration (VII) initiative. (Note that the US DOT's Research and Innovative Technology Administration (RITA) subsequently renamed VII to be IntelliDrive^{SM}.) Commercial vehicle drivers and motor carriers will utilize and benefit from many IntelliDrive^{SM} functions, including, for example, access to traveler information and in-vehicle signing. To reflect that, the CVISN Architecture is being expanded to include general vehicle and driver components of the National ITS Architecture (see Figure 2–3; CR 6320). Figure 2–3 and descriptions of the Vehicle Subsystem's equipment packages and architecture flows are included for the first time in this version of the CVISN Architecture. When states plan their CVISN deployments, they should consider how to take advantage of the general functions and information sharing that are represented on the diagram.

Connections and data exchanges shown on the figures are marked with different line types to differentiate the means of communication used. The definitions provided below are from the National ITS Architecture (Reference [6]).

- Fixed Point – Fixed Point Communications: A communications link that provides communications among stationary entities. It may be implemented using a variety of public or private communication networks and technologies. These links support a variety of maintenance, monitoring and management services. It can include, but is not limited to, twisted pair, coaxial cable, fiber optic, microwave relay networks, spread spectrum, etc.

  OR

  Wide Area Wireless (Mobile) Communications: A wireless communications system that offers broad coverage, enabling communications with vehicles and traveler mobile devices at any location on or off the road network. Both broadcast (one-way) and interactive (two-way) communications services are grouped into wide-area wireless communications in the National ITS Architecture. These links support a range of services in the National ITS Architecture including real-time traveler information and various forms of fleet communications. Technologies supporting this type of link include cellular networks, Worldwide Interoperability for Microwave Access (WiMAX), wireless mesh networks, and any other wireless network technology that offers broad regional coverage.

  Note: For CVISN the distinction between Fixed Point – Fixed Point and Wide Area Wireless communications is unimportant. In this version of this document, no distinction is made.

- Field – Vehicle Communications: A wireless communications channel used for broadcast and interactive close-proximity communications between vehicles and the immediate infrastructure. It supports location-specific communications for ITS capabilities such as toll collection, transit vehicle management, driver information, and automated commercial vehicle operations as well as IntelliDrive^{SM} applications. This communication channel is supported by technologies such as 5.9 GHz Band Wireless

Access in Vehicular Environments (WAVE) / Dedicated Short Range Communications (DSRC), Wi-Fi, WiMAX, and wireless mesh networks.

Note: In the previous version of the architecture, this was called DSRC.

- Vehicle – Vehicle Communications: A short range wireless communications link among vehicles (e.g. mobile system to mobile systems). Advanced vehicle services may use this link in the future to support advanced collision avoidance implementations, road condition information sharing, and active coordination between advanced vehicle control systems. Technologies that could support this communications channel include 5.9 GHz Band WAVE/DSRC.
- Human Interface: Interface between a human user and a device. Can be a user interface to a computer system, an operator interface, or the driver's interface to a vehicle.
- Other Transactions: Any of the following National ITS Architecture's architecture interconnects – Contact or Proximity Interface, Internal Vehicle Interface, Physical Interface, or Position Location Interface.

Symbols for the Archive Data Management Subsystem, Traffic Management Subsystem, Emergency Management Subsystem, the Freight Equipment terminator, the Intermodal Freight Shipper terminator, the Alerting and Advisory Systems terminator, and the Border Inspection Systems terminator contain the text string "(2)" or "(3)", indicating how many times that symbol appears on the diagram. This was done to maintain a semblance of readability and has nothing to do with functionality.

2.3 Tables

In the discussion of the tables, a "flow" is comprised of the source, destination, and architecture flow name. "Flow name" is a label for a set of data elements. A list of the acronyms and abbreviations used in the tables is given just prior to Table 1.

The tables provided are:

Table 1. CVISN Architecture Flows (Subsystems, Terminators, Standards)

Table 2. CVISN Architecture Flows (Equipment Packages, Expanded CVISN Capabilities) (excludes the Vehicle Subsystem and Driver Terminator)

Table 3. CVISN Architecture Flows (Equipment Packages) for the Vehicle Subsystem and Driver Terminator

Table 4. CVISN Architecture Flow Names and Descriptions

Table 5. Subsystem and Terminator Descriptions

Table 6. Equipment Package Descriptions

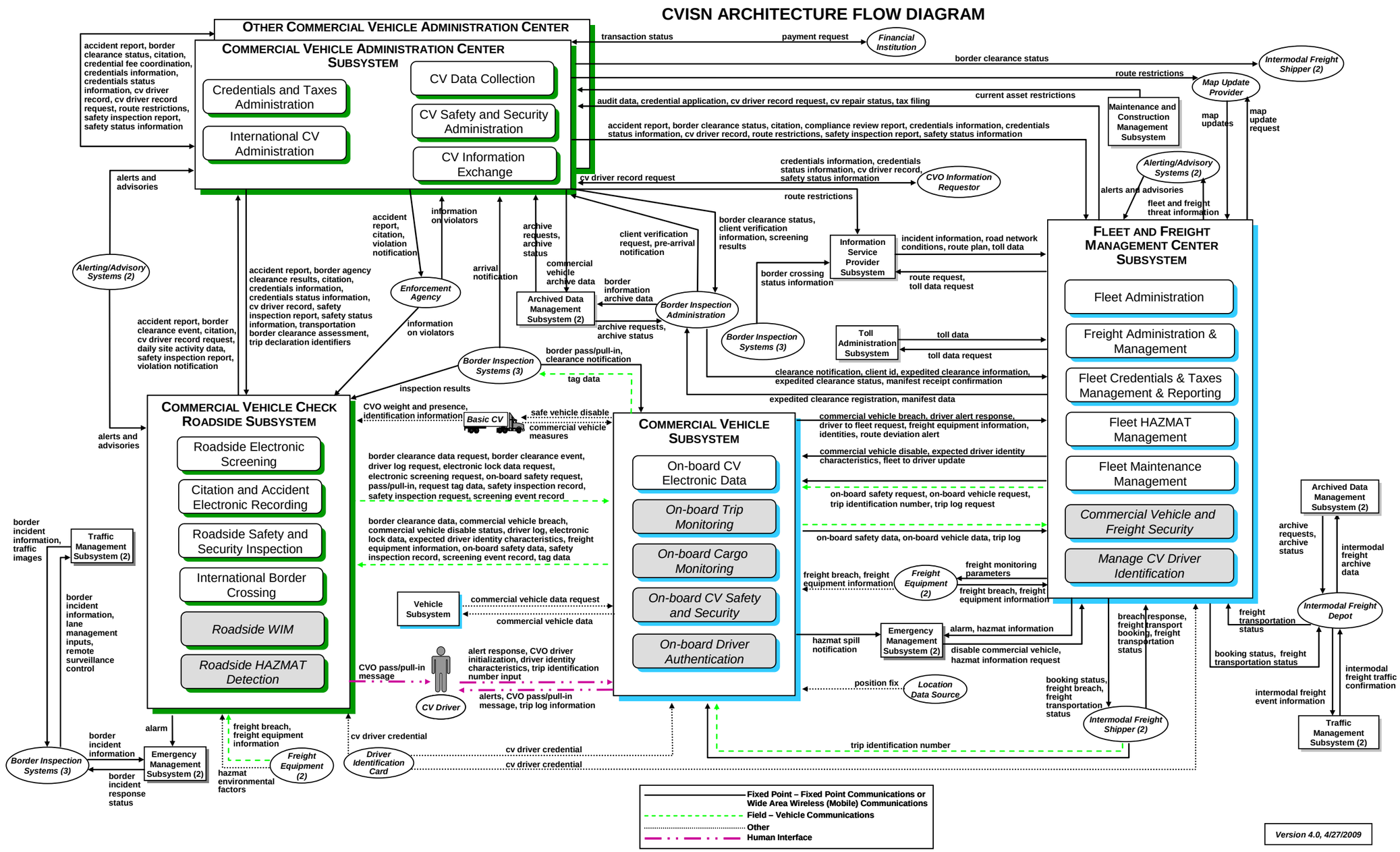

Figure 2–2: CVISN Architecture Flow Diagram

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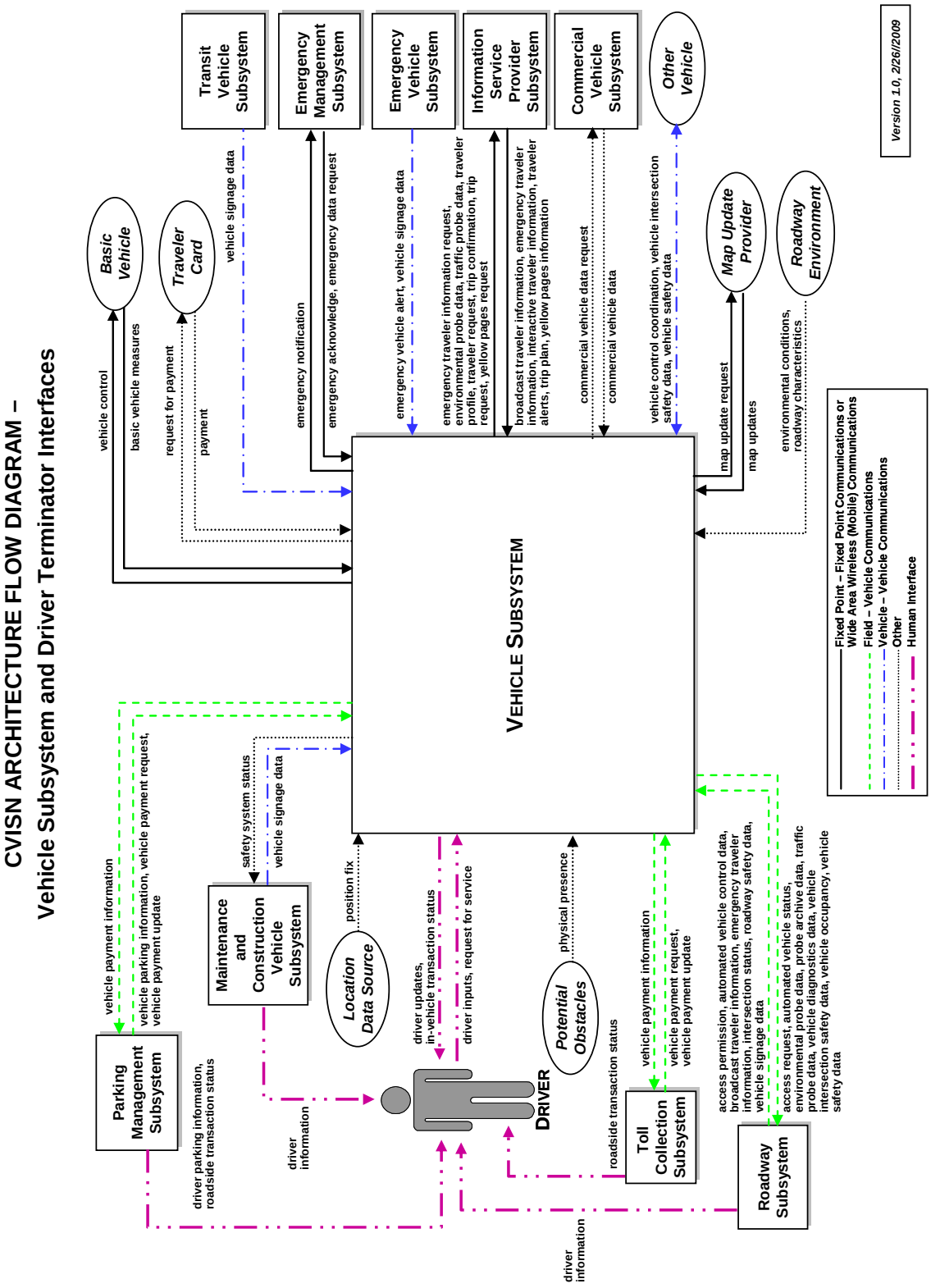

Figure 2–3: Vehicle Subsystem and Driver Terminator Architecture Flow Diagram

ACRONYMS AND ABBREVIATIONS

AAS:	Alerting and Advisory Systems
ADMS:	Archived Data Management Subsystem
BCV:	Basic Commercial Vehicle
BIA:	Border Inspection Administration
BIS:	Border Inspection Systems
BCV:	Basic Commercial Vehicle
BV:	Basic Vehicle
CV	Commercial Vehicle
CVAS:	Commercial Vehicle Administration Subsystem
CVCS:	Commercial Vehicle Check Subsystem
CV Driver:	Commercial Vehicle Driver
CVOIR:	Commercial Vehicle Operations Information Requestor
CVS:	Commercial Vehicle Subsystem
DIDC:	Driver Identification Card (this term is used only by CVISN)
Driver:	generic vehicle Driver
EA:	(Law) Enforcement Agency
EMS:	Emergency Management Subsystem
EP:	Equipment Package
EVS:	Emergency Vehicle Subsystem
ExC:	Expanded CVISN
FE:	Freight Equipment
FI:	Financial Institution
FMS:	Fleet and Freight Management Subsystem
IFD:	Intermodal Freight Depot
IFS:	Intermodal Freight Shipper
ISP:	Information Service Provider Subsystem
LDS:	Location Data Source
MCMS:	Maintenance and Construction Management Subsystem
MCVS:	Maintenance and Construction Vehicle Subsystem
MUP:	Map Update Provider
OV:	Other Vehicle
PMS:	Parking Management Subsystem
PO:	Potential Obstacles
RE:	Roadway Environment
RS:	Roadway Subsystem
TAS:	Toll Administration Subsystem
TC:	Traveler Card
TCS:	Toll Collection Subsystem
TMS:	Traffic Management Subsystem
TVS:	Transit Vehicle Subsystem
VS:	Vehicle Subsystem

Table 1 presents a detailed look at each architecture flow contained in the CVISN Architecture Flow Diagram [Figures 2–2 and 2-3].

This table is ordered alphabetically by source and destination subsystem/terminator. An "X" in the Std. column indicates that there are standards that apply to the architecture flow; refer to Version 6.1 of the National ITS Architecture for the applicable standards (Reference [6]). In the National ITS Architecture, many architecture flows are identified as candidates for future standardization; those are marked as "future" in the Std. column. The CR # column indicates applicable Change Requests for the flow.

It should be noted that version 6.0 of the National ITS Architecture removed the references to Electronic Data Interchange (EDI) standards that are no longer widely used for CVISN applications. These are identified with CR6322. For details about the 915 MHz Dedicated Short Range Communications (DSRC) standards used in CVO, please see the COACH Part 1 (Reference [7]). The 915 MHz DSRC guidelines referenced in the COACH Part 1 remain the de facto standard in the CVO community until 5.9 GHz standards and products are ready.

Table 1. CVISN Architecture Flows (Subsystems and Terminators)

Source	Destination	Flow Name	Std.	CR #
AAS	CVAS	alerts and advisories	future	
AAS	CVCS	alerts and advisories	future	
AAS	FMS	alerts and advisories	future	
ADMS	BIA	archive requests	future	CR6318
ADMS	BIA	archive status	future	CR6318
ADMS	CVAS	archive requests	future	
ADMS	CVAS	archive status	future	
ADMS	IFD	archive requests	future	CR6318
ADMS	IFD	archive status	future	CR6318
BCV	CVCS	CVO weight and presence		
BCV	CVCS	identification information		
BCV	CVS	commercial vehicle measures	future	CR6320
BIA	ADMS	border information archive data	future	CR6318
BIA	CVAS	client verification request	future	CR6318
BIA	CVAS	pre-arrival notification	future	CR6318
BIA	FMS	clearance notification	future	CR6318
BIA	FMS	client id	future	CR6318
BIA	FMS	expedited clearance information	future	CR6318

Source	Destination	Flow Name	Std.	CR #
BIA	FMS	expedited clearance status	future	CR6318
BIA	FMS	manifest receipt confirmation	future	CR6318
BIS	CVAS	arrival notification	future	CR6318
BIS	CVCS	inspection results	future	CR6318
BIS	CVS	border pass/pull-in	future	CR6318
BIS	CVS	clearance notification	future	CR6318
BIS	EMS	border incident information	future	CR6318
BIS	ISP	border crossing status information	future	CR6318
BIS	TMS	border incident information	future	CR6318
BIS	TMS	lane management inputs	future	CR6318
BIS	TMS	remote surveillance control	future	CR6318
BV	VS	basic vehicle measures		CR6320
CVAS	ADMS	commercial vehicle archive data	future	CR6322
CVAS	BIA	border clearance status	future	CR6411
CVAS	BIA	client verification information	future	CR6318
CVAS	BIA	screening results	future	CR6318
CVAS	CVCS	accident report	future	
CVAS	CVCS	border agency clearance results	future	
CVAS	CVCS	citation	future	
CVAS	CVCS	credentials information		CR6322 CR6410
CVAS	CVCS	credentials status information		CR6322
CVAS	CVCS	cv driver record	future	
CVAS	CVCS	safety inspection report		CR6322
CVAS	CVCS	safety status information		CR6322
CVAS	CVCS	transportation border clearance assessment	future	
CVAS	CVCS	trip declaration identifiers	future	
CVAS	CVOIR	credentials information		CR6322
CVAS	CVOIR	credentials status information		CR6322
CVAS	CVOIR	cv driver record	future	
CVAS	CVOIR	safety status information		CR6322
CVAS	EA	accident report	future	
CVAS	EA	citation	future	
CVAS	EA	violation notification	future	

Source	Destination	Flow Name	Std.	CR #
CVAS	FI	payment request		
CVAS	FMS	accident report	future	
CVAS	FMS	border clearance status	future	
CVAS	FMS	citation	future	
CVAS	FMS	compliance review report	future	
CVAS	FMS	credentials information		CR6322
CVAS	FMS	credentials status information		CR6322
CVAS	FMS	cv driver record	future	
CVAS	FMS	route restrictions	future	
CVAS	FMS	safety inspection report		CR6322
CVAS	FMS	safety status information		CR6322
CVAS	IFS	border clearance status	future	
CVAS	ISP	route restrictions	future	
CVAS	MUP	route restrictions	future	
CVAS	Other CVAS	accident report	future	
CVAS	Other CVAS	border clearance status	future	
CVAS	Other CVAS	citation	future	
CVAS	Other CVAS	credential fee coordination	future	
CVAS	Other CVAS	credentials information		CR6322
CVAS	Other CVAS	credentials status information		CR6322
CVAS	Other CVAS	cv driver record	future	
CVAS	Other CVAS	cv driver record request	future	
CVAS	Other CVAS	route restrictions	future	
CVAS	Other CVAS	safety inspection report		CR6322
CVAS	Other CVAS	safety status information		CR6322
CVCS	CVAS	accident report	future	
CVCS	CVAS	border clearance event	future	
CVCS	CVAS	citation	future	
CVCS	CVAS	cv driver record request	future	
CVCS	CVAS	daily site activity data	future	
CVCS	CVAS	safety inspection report	X	CR6322
CVCS	CVAS	violation notification	future	
CVCS	CV Driver	CVO pass/pull-in message		
CVCS	CVS	border clearance data request	X	CR6320

Source	Destination	Flow Name	Std.	CR #
CVCS	CVS	border clearance event	X	CR6320
CVCS	CVS	driver log request	future	CR6320
CVCS	CVS	electronic lock data request	X	CR6320
CVCS	CVS	electronic screening request	X	CR6320
CVCS	CVS	on-board safety request	X	CR6320
CVCS	CVS	pass/pull-in	X	CR6320
CVCS	CVS	request tag data	future	CR6320
CVCS	CVS	safety inspection record	future	CR6320
CVCS	CVS	safety inspection request	future	CR6320
CVCS	CVS	screening event record	X	CR6320
CVCS	EMS	alarm	future	
CV Driver	CVS	alert response		CR6320
CV Driver	CVS	CVO driver initialization		CR6320
CV Driver	CVS	driver identity characteristics		CR6320
CV Driver	CVS	trip identification number input		CR6320
CVOIR	CVAS	cv driver record request	future	
CVS	BCV	safe vehicle disable	future	CR6320
CVS	BIS	tag data	future	CR6318
CVS	CVCS	border clearance data	X	CR6320
CVS	CVCS	commercial vehicle breach	future	CR6320
CVS	CVCS	commercial vehicle disable status	future	CR4966 CR6320
CVS	CVCS	driver log	future	CR6320
CVS	CVCS	electronic lock data	X	CR6320
CVS	CVCS	expected driver identity characteristics	future	CR6320
CVS	CVCS	freight equipment information	future	CR6320
CVS	CVCS	on-board safety data	X	CR6320
CVS	CVCS	safety inspection record	future	CR6320
CVS	CVCS	screening event record	X	CR6320
CVS	CVCS	tag data	future	CR6320
CVS	CV Driver	alerts		CR6320
CVS	CV Driver	CVO pass/pull-in message		CR6320

Source	Destination	Flow Name	Std.	CR #
CVS	CV Driver	trip log information		CR6320
CVS	EMS	hazmat spill notification	future	CR6320
CVS	FMS	commercial vehicle breach	future	CR6320
CVS	FMS	driver alert response	future	CR6320
CVS	FMS	driver to fleet request	future	CR6320
CVS	FMS	freight equipment information	future	CR6320
CVS	FMS	identities	future	CR6320
CVS	FMS	on-board safety data	X	CR6320 CR6322
CVS	FMS	on-board vehicle data	future	CR6320
CVS	FMS	route deviation alert	future	CR6320
CVS	FMS	trip log	future	CR6320
CVS	VS	commercial vehicle data	future	CR6320
DIDC	CVCS	cv driver credential	future	
DIDC	CVS	cv driver credential	future	CR6320
DIDC	FMS	cv driver credential	future	
Driver	VS	driver inputs		CR6320
Driver	VS	request for service		CR6320
EA	CVAS	information on violators	future	
EA	CVCS	information on violators	future	
EMS	BIS	border incident response status	future	CR6318
EMS	FMS	disable commercial vehicle	future	
EMS	FMS	hazmat information request	X	
EMS	VS	emergency acknowledge	X	CR6320
EMS	VS	emergency data request	X	CR6320
EVS	VS	emergency vehicle alert	X	CR6320
EVS	VS	vehicle signage data	X	CR6320
FE	CVCS	freight breach	future	
FE	CVCS	freight equipment information	future	
FE	CVCS	hazmat environmental factors		
FE	CVS	freight breach	future	CR6320
FE	CVS	freight equipment information	future	CR6320
FE	FMS	freight breach	future	
FE	FMS	freight equipment information	future	
FI	CVAS	transaction status		

Source	Destination	Flow Name	Std.	CR #
FMS	AAS	fleet and freight threat information	future	
FMS	BIA	expedited clearance registration	future	CR6318
FMS	BIA	manifest data	future	CR6318
FMS	CVAS	audit data	future	
FMS	CVAS	credential application		CR6322
FMS	CVAS	cv driver record request	future	
FMS	CVAS	cv repair status	future	
FMS	CVAS	tax filing	X	
FMS	CVS	commercial vehicle disable	future	CR6320
FMS	CVS	expected driver identity characteristics	future	CR6320
FMS	CVS	fleet to driver update	future	CR6320
FMS	CVS	on-board safety request	X	CR6320
FMS	CVS	on-board vehicle request	future	CR6320
FMS	CVS	trip identification number	future	CR6320
FMS	CVS	trip log request	future	CR6320
FMS	EMS	alarm	future	
FMS	EMS	hazmat information	X	
FMS	FE	freight monitoring parameters	future	
FMS	IFD	booking status	future	
FMS	IFD	freight transportation status		CR6333
FMS	IFS	booking status	future	
FMS	IFS	freight breach	future	
FMS	IFS	freight transportation status		CR6333
FMS	ISP	route request	X	
FMS	ISP	toll data request	future	
FMS	MUP	map update request		
FMS	TAS	toll data request	future	
IFD	ADMS	intermodal freight archive data	future	CR6318
IFD	FMS	freight transportation status		CR6333
IFD	TMS	intermodal freight event information	future	CR6318
IFS	CVS	trip identification number	future	CR6320
IFS	FMS	breach response	future	
IFS	FMS	freight transport booking	future	
IFS	FMS	freight transportation status		CR6333
ISP	FMS	incident information	X	CR6321

Source	Destination	Flow Name	Std.	CR #
ISP	FMS	road network conditions	X	
ISP	FMS	route plan	X	
ISP	FMS	toll data	future	CR6319
ISP	VS	broadcast traveler information	X	CR6320
ISP	VS	emergency traveler information	future	CR6320
ISP	VS	interactive traveler information	X	CR6320
ISP	VS	traveler alerts	X	CR6320 CR6321
ISP	VS	trip plan	X	CR6320
ISP	VS	yellow pages information	X	CR6320
LDS	CVS	position fix		CR6319 CR6320
LDS	VS	position fix		CR6320
MCMS	CVAS	current asset restrictions	future	
MCVS	VS	vehicle signage data	X	CR6320
MCVS	Driver	driver information		CR6320
MUP	FMS	map updates		
MUP	VS	map updates		CR6320
Other CVAS	CVAS	accident report	future	
Other CVAS	CVAS	border clearance status	future	
Other CVAS	CVAS	citation	future	
Other CVAS	CVAS	credential fee coordination	future	
Other CVAS	CVAS	credentials information		CR6322 CR6410
Other CVAS	CVAS	credentials status information		CR6322
Other CVAS	CVAS	cv driver record	future	
Other CVAS	CVAS	cv driver record request	future	
Other CVAS	CVAS	route restrictions	future	
Other CVAS	CVAS	safety inspection report		CR6322
Other CVAS	CVAS	safety status information		CR6322
OV	VS	vehicle control coordination	future	CR6320
OV	VS	vehicle intersection safety data	X	CR6319 CR6320
OV	VS	vehicle safety data	X	CR6320
PMS	Driver	driver parking information		CR6320

Source	Destination	Flow Name	Std.	CR #
PMS	Driver	roadside transaction status		CR6320
PMS	VS	vehicle parking information	X	CR6320
PMS	VS	vehicle payment request	X	CR6320
PMS	VS	vehicle payment update	X	CR6320
PO	VS	physical presence		CR6320
RE	VS	environmental conditions		CR6320
RE	VS	roadway characteristics		CR6320
RS	Driver	driver information		CR6320
RS	VS	access permission	future	CR6320
RS	VS	automated vehicle control data	future	CR6320
RS	VS	broadcast traveler information	X	CR6320
RS	VS	emergency traveler information	future	CR6320
RS	VS	intersection status	X	CR6319 CR6320
RS	VS	roadway safety data	X	CR6320
RS	VS	vehicle signage data	X	CR6320
TAS	FMS	toll data	future	CR6319
TC	VS	payment		CR6320
TCS	Driver	roadside transaction status		CR6320
TCS	VS	vehicle payment request	X	CR6320
TCS	VS	vehicle payment update	X	CR6320
TMS	BIS	border incident information	future	CR6318
TMS	BIS	traffic images	future	CR6318
TMS	IFD	intermodal freight traffic confirmation	future	CR6318
TVS	VS	vehicle signage data	X	CR6320
VS	BV	vehicle control		CR6320
VS	CVS	commercial vehicle data request	future	CR6320
VS	Driver	driver updates		CR6320
VS	Driver	in-vehicle transaction status		CR6320
VS	EMS	emergency notification	X	CR6320
VS	ISP	emergency traveler information request	future	CR6320
VS	ISP	environmental probe data	future	CR6320
VS	ISP	traffic probe data	future	CR6320
VS	ISP	traveler profile	X	CR6320 CR6321

Source	Destination	Flow Name	Std.	CR #
VS	ISP	traveler request	X	CR6320
VS	ISP	trip confirmation	X	CR6320
VS	ISP	trip request	X	CR6320
VS	ISP	yellow pages request	X	CR6320
VS	MUP	map update request		CR6320
VS	OV	vehicle control coordination	future	CR6320
VS	OV	vehicle intersection safety data	X	CR6319 CR6320
VS	OV	vehicle safety data	X	CR6320
VS	PMS	vehicle payment information	X	CR6320
VS	RS	access request	future	CR6320
VS	RS	automated vehicle status	future	CR6320
VS	RS	environmental probe data	X	CR6320
VS	RS	probe archive data	X	CR6320
VS	RS	traffic probe data	future	CR6320
VS	RS	vehicle diagnostics data	future	CR6320
VS	RS	vehicle intersection safety data	X	CR6319 CR6320
VS	RS	vehicle occupancy	future	CR6320
VS	RS	vehicle safety data	X	CR6320
VS	MCVS	safety system status	future	CR6320
VS	TC	request for payment		CR6320
VS	TCS	vehicle payment information	X	CR6320

Table 2 shows the architecture flows and their source/destination equipment packages (EPs) and associated Expanded CVISN (ExC) capabilities. (Vehicle Subsystem and Driver Terminator interfaces are shown in Table 3.)

This table was inserted into Version V3.0 of the document in response to CR 4763. The table was updated in V4.0 to reflect changes related to all applicable CRs listed in Section 3.1. Source or destination terminators are shown in ()'s. For EPs that are not shown on the CVISN Architecture Flow Diagram, the associated subsystem is retained following the name of the EP (e.g., "Emergency Commercial Vehicle Response – EMS"). If a new EP-to-EP connection supports an Expanded CVISN capability, a reference to the capability is shown in the last column. The Expanded CVISN capabilities are defined in Appendix B.

Table 2. CVISN Architecture Flows (Equipment Packages, Expanded CVISN Capabilities)

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)	ExC Cap.
accident report	CV Information Exchange, CV Safety and Security Administration	Roadside Safety and Security Inspection	R2
accident report	CV Information Exchange, CV Safety and Security Administration	(EA)	
accident report	CV Information Exchange, CV Safety and Security Administration	Fleet Administration	
accident report	Citation and Accident Electronic Recording	CV Information Exchange, CV Safety and Security Administration	
accident report	CV Information Exchange	(Other CVAS)	S7
accident report	(Other CVAS)	CV Information Exchange	S7
alarm	Roadside HAZMAT Detection	Emergency Commercial Vehicle Response – EMS	
alarm	Commercial Vehicle and Freight Security, Fleet Administration, Manage CV Driver Identification	Emergency Commercial Vehicle Response – EMS	
alert response	(CV Driver)	On-board CV Safety and Security, On-board Trip Monitoring	
alerts	On-board CV Safety and Security, On-board Trip Monitoring	(CV Driver)	
alerts and advisories	(AAS)	CV Safety and Security Administration	D6, R11

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)	ExC Cap.
alerts and advisories	(AAS)	Roadside Safety and Security Inspection, Roadside Electronic Screening	R2, R11
alerts and advisories	(AAS)	Commercial Vehicle and Freight Security, Fleet Administration	
archive requests	ITS Data Repository – ADMS	(BIA)	
archive requests	ITS Data Repository – ADMS	CV Data Collection	
archive requests	ITS Data Repository – ADMS	(IFD)	
archive status	ITS Data Repository – ADMS	(BIA)	
archive status	ITS Data Repository – ADMS	CV Data Collection	
archive status	ITS Data Repository – ADMS	(IFD)	
arrival notification	(BIS)	International CV Administration	C9, S3
audit data	Fleet Credentials & Taxes Management & Reporting	Credentials and Taxes Administration	
booking status	Freight Administration and Management	(IFD)	
booking status	Freight Administration and Management	(IFS)	
border agency clearance results	International CV Administration	International Border Crossing	
border clearance data	On-board CV Electronic Data	International Border Crossing	
border clearance data request	International Border Crossing	On-board CV Electronic Data	
border clearance event	International Border Crossing	International CV Administration	
border clearance event	International Border Crossing	On-board CV Electronic Data	
border clearance status	CV Information Exchange, International CV Administration	Freight Administration and Management	
border clearance status	CV Information Exchange, International CV Administration	(IFS)	
border clearance status	CV Information Exchange, International CV Administration	(Other CVAS)	
border clearance status	CV Information Exchange, International CV Administration	(BIA)	
border clearance status	(Other CVAS)	CV Information Exchange, International CV Administration	
border crossing status information	(BIS)	ISP Traveler Data Collection – ISP	

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)	ExC Cap.
border incident information	(BIS)	TMC Incident Detection – TMS, TMC Incident Dispatch Coordination/Communication – TMS	
border incident information	(BIS)	Emergency Response Management – EMS	
border incident information	TMC Incident Detection – TMS, TMC Incident Dispatch Coordination/Communication – TMS	(BIS)	
border incident response status	Emergency Response Management – EMS	(BIS)	
border information archive data	(BIA)	ITS Data Repository – ADMS	
border pass/pull-in	(BIS)	On-board CV Electronic Data	
breach response	(IFS)	Commercial Vehicle and Freight Security	
citation	CV Information Exchange, CV Safety and Security Administration	Roadside Safety and Security Inspection	R2
citation	CV Information Exchange, CV Safety and Security Administration	(EA)	
citation	CV Information Exchange, CV Safety and Security Administration	Fleet Administration	
citation	CV Information Exchange	(Other CVAS)	D11, S7
citation	Citation and Accident Electronic Recording	CV Information Exchange, CV Safety and Security Administration	
citation	(Other CVAS)	CV Information Exchange	D11, S7
clearance notification	(BIA)	Freight Administration and Management	C9
clearance notification	(BIS)	On-board CV Electronic Data	C9
client id	(BIA)	Freight Administration and Management	C9
client verification information	International CV Administration	(BIA)	C9, S3
client verification request	(BIA)	International CV Administration	C9, S3
commercial vehicle archive data	CV Data Collection	ITS Data Repository – ADMS	
commercial vehicle breach	On-board CV Safety and Security	Roadside Safety and Security Inspection	

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)	ExC Cap.
commercial vehicle breach	On-board CV Safety and Security	Commercial Vehicle and Freight Security	
commercial vehicle data	On-Board Cargo Monitoring	Vehicle Mayday I/F	
commercial vehicle data request	Vehicle Mayday I/F	On-Board Cargo Monitoring	
commercial vehicle disable	Manage CV Driver Identification	On-board Driver Authentication	
commercial vehicle disable status	On-board CV Safety and Security	Roadside Safety and Security Inspection	R1
commercial vehicle measures	(BCV)	On-board Cargo Monitoring, On-board Trip Monitoring	
compliance review report	Credentials and Taxes Administration	Fleet Credentials & Taxes Management & Reporting	
credential application	Fleet Credentials & Taxes Management & Reporting	Credentials and Taxes Administration	
credential fee coordination	Credentials and Taxes Administration	(Other CVAS)	
credential fee coordination	(Other CVAS)	Credentials and Taxes Administration	
credentials information	CV Information Exchange	Roadside Electronic Screening, Roadside HAZMAT Detection	
credentials information	Credentials and Taxes Administration	Roadside HAZMAT Detection	
credentials information	Credentials and Taxes Administration, CV Information Exchange	(CVOIR)	
credentials information	Credentials and Taxes Administration, CV Information Exchange	Fleet Credentials & Taxes Management & Reporting	
credentials information	Credentials and Taxes Administration, CV Information Exchange	(Other CVAS)	
credentials information	Credentials and Taxes Administration, CV Information Exchange	Roadside Safety and Security Inspection	R2
credentials information	(Other CVAS)	CV Information Exchange, Credentials and Taxes Administration	
credentials status information	CV Information Exchange, CV Safety and Security Administration	Roadside Electronic Screening	
credentials status information	CV Information Exchange	Roadside Safety and Security Inspection	D1, D2, R2
credentials status information	CV Information Exchange	Fleet Administration	D1, D2
credentials status information	CV Information Exchange	(CVOIR)	

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)	ExC Cap.
credentials status information	CV Information Exchange	Fleet Credentials & Taxes Management & Reporting	
credentials status information	CV Information Exchange, CV Safety and Security Administration	(Other CVAS)	
credentials status information	(Other CVAS)	CV Information Exchange	
current asset restrictions	MCM Work Activity Coordination – MCMS	Credentials and Taxes Administration	
cv driver credential	(DIDC)	Roadside Safety and Security Inspection, Citation and Accident Electronic Reporting	D10
cv driver credential	(DIDC)	On-board Driver Authentication	D10
cv driver credential	(DIDC)	Manage CV Driver Identification	D2, D10
cv driver record	CV Information Exchange	Citation and Accident Electronic Recording, Roadside Safety and Security Inspection	D1, D2, R2
cv driver record	CV Information Exchange	Fleet Administration	D1, D2, D7
cv driver record	CV Information Exchange	(CVOIR)	D9
cv driver record	CV Information Exchange	(Other CVAS)	D1, D2, C7
cv driver record	(Other CVAS)	CV Information Exchange	D1, D2, C7
cv driver record request	Citation and Accident Electronic Recording, Roadside Safety and Security Inspection	CV Information Exchange	D1, D2, R2
cv driver record request	Fleet Administration	CV Information Exchange	D1, D2, D7
cv driver record request	(CVOIR)	CV Information Exchange	D9
cv driver record request	(Other CVAS)	CV Information Exchange	D1, D2, C7

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)	ExC Cap.
cv driver record request	CV Information Exchange	(Other CVAS)	D1, D2, C7
cv repair status	Fleet Maintenance Management	CV Safety and Security Administration	S5
CVO driver initialization	(CV Driver)	On-board CV Electronic Data, On-board Trip Monitoring	
CVO pass/pull-in message	Roadside Electronic Screening, Roadside HAZMAT Detection, Roadside Safety and Security Inspection, Roadside WIM	(CV Driver)	
CVO pass/pull-in message	On-board CV Electronic Data, On-board CV Safety and Security	(CV Driver)	
CVO weight and presence	(BCV)	Roadside Electronic Screening, Roadside HAZMAT Detection, Roadside WIM	
daily site activity data	Citation and Accident Electronic Recording, Roadside Electronic Screening	CV Safety and Security Administration	
disable commercial vehicle	Emergency Commercial Vehicle Response – EMS	Manage CV Driver Identification	
driver alert response	On-board CV Safety and Security	Commercial Vehicle and Freight Security	
driver alert response	On-board Trip Monitoring	Fleet Administration	
driver identity characteristics	(CV Driver)	On-board Driver Authentication	
driver log	On-board CV Safety and Security	Roadside Safety and Security Inspection	
driver log request	Roadside Safety and Security Inspection	On-board CV Safety and Security	
driver to fleet request	On-board Trip Monitoring	Fleet Administration	
electronic lock data	On-board CV Electronic Data	International Border Crossing	
electronic lock data	On-board CV Electronic Data	Roadside Safety and Security Inspection	R1
electronic lock data request	Roadside Safety and Security Inspection	On-board CV Electronic Data	R1
electronic lock data request	International Border Crossing	On-board CV Electronic Data	

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)	ExC Cap.
electronic screening request	Roadside Electronic Screening, Roadside WIM	On-board CV Electronic Data	
expected driver identity characteristics	On-board Safety and Security	Roadside Safety and Security Inspection	R1
expected driver identity characteristics	Manage CV Driver Identification	On-board Driver Authentication	
expedited clearance information	(BIA)	Freight Administration and Management	C9
expedited clearance registration	Freight Administration and Management	(BIA)	C9
expedited clearance status	(BIA)	Freight Administration and Management	C9
fleet and freight threat information	Commercial Vehicle and Freight Security, Fleet Administration	(AAS)	
fleet to driver update	Fleet Administration	On-board Trip Monitoring	
freight breach	(FE)	Roadside Safety and Security Inspection	
freight breach	(FE)	On-board CV Safety and Security	
freight breach	(FE)	Commercial Vehicle and Freight Security	
freight breach	Commercial Vehicle and Freight Security	(IFS)	
freight equipment information	On-board Cargo Monitoring	Citation and Accident Electronic Recording	R1
freight equipment information	On-board Cargo Monitoring	Roadside Safety and Security Inspection	R11
freight equipment information	On-board Cargo Monitoring	Commercial Vehicle and Freight Security, Freight Administration and Management	
freight equipment information	(FE)	Roadside Safety and Security Inspection	
freight equipment information	(FE)	Roadside Electronic Screening,	R11

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)	ExC Cap.
freight equipment information	(FE)	On-board Cargo Monitoring, On-board CV Electronic Data	
freight equipment information	(FE)	Commercial Vehicle and Freight Security, Freight Administration and Management	
freight monitoring parameters	Commercial Vehicle and Freight Security	(FE)	
freight transport booking	(IFS)	Freight Administration and Management	
freight transportation status	Freight Administration and Management	(IFD)	
freight transportation status	Freight Administration and Management	(IFS)	
freight transportation status	(IFD)	Freight Administration and Management	
freight transportation status	(IFS)	Freight Administration and Management	
hazmat environmental factors	(FE)	Roadside HAZMAT Detection	
hazmat information	Fleet HAZMAT Management	Emergency Commercial Vehicle Response – EMS	
hazmat information request	Emergency Commercial Vehicle Response – EMS	Fleet HAZMAT Management	
hazmat spill notification	On-board Cargo Monitoring	Emergency Commercial Vehicle Response – EMS	
identification information	(BCV)	Roadside Electronic Screening, Roadside HAZMAT Detection, Roadside WIM	
identities	On-board Driver Authentication	Commercial Vehicle and Freight Security, Manage CV Driver Identification	
incident information	ISP Operational Data Repository – ISP	Fleet Administration	
information on violators	(EA)	Credentials and Taxes Administration	
information on violators	(EA)	Roadside Electronic Screening	
inspection results	(BIS)	International Border Crossing	S3

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)	ExC Cap.
intermodal freight archive data	(IFD)	ITS Data Repository – ADMS	
intermodal freight event information	(IFD)	TMC Incident Detection – TMS	
intermodal freight traffic confirmation	TMC Incident Detection – TMS	(IFD)	
lane management inputs	(BIS)	TMC Incident Dispatch Coordination/Communication – TMS	
manifest data	Freight Administration and Management	(BIA)	C9
manifest receipt confirmation	(BIA)	Freight Administration and Management	C9
map update request	Fleet Administration	(MUP)	
map updates	(MUP)	Fleet Administration	
on-board safety data	On-board CV Safety and Security	Roadside Safety and Security Inspection	
on-board safety data	On-board CV Safety and Security	Roadside Electronic Screening, Citation and Accident Electronic Recording	R1
on-board safety data	On-board CV Safety and Security, On-board Trip Monitoring	Fleet Maintenance Management	
on-board safety request	Roadside Safety and Security Inspection	On-board CV Safety and Security	
on-board safety request	Roadside Electronic Screening, Citation and Accident Electronic Recording	On-board CV Safety and Security	R1
on-board safety request	Fleet Maintenance Management	On-board CV Safety and Security, On-board Trip Monitoring	
on-board vehicle data	On-board Trip Monitoring	Fleet Administration, Fleet Maintenance Management, Freight Administration and Management	
on-board vehicle request	Fleet Administration, Fleet Maintenance Management, Freight Administration and Management	On-board Trip Monitoring	

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)	ExC Cap.
pass/pull-in	Roadside Electronic Screening, Roadside HAZMAT Detection, Roadside Safety and Security Inspection, Roadside WIM	On-board CV Electronic Data	
pass/pull-in	Roadside Safety and Security Inspection	On-board CV Safety and Security	
payment request	Credentials and Taxes Administration	(FI)	
position fix	(LDS)	On-board Cargo Monitoring, On-board Trip Monitoring	
pre-arrival notification	(BIA)	International CV Administration	C9, S3
remote surveillance control	(BIS)	TMC Incident Detection – TMS, TMC Incident Dispatch Coordination/Communication – TMS	
request tag data	Roadside Safety and Security Inspection, Roadside Electronic Screening	On-board CV Electronic Data	R1
request tag data	Roadside Safety and Security Inspection	On-board CV Safety and Security	
request tag data	International Border Crossing, Roadside WIM	On-board CV Electronic Data	
road network conditions	ISP Operational Data Repository – ISP	Fleet Administration	
route deviation alert	On-board Trip Monitoring	Fleet Administration	
route plan	Infrastructure Provided Trip Planning – ISP	Fleet Administration	
route request	Fleet Administration	Infrastructure Provided Trip Planning – ISP	
route restrictions	Credentials and Taxes Administration	Fleet Administration	
route restrictions	Credentials and Taxes Administration	ISP Traveler Data Collection – ISP	
route restrictions	Credentials and Taxes Administration	(MUP)	
route restrictions	Credentials and Taxes Administration	(Other CVAS)	
route restrictions	(Other CVAS)	Credentials and Taxes Administration	
safe vehicle disable	On-board Driver Authentication	(BCV)	
safety inspection record	Roadside Safety and Security Inspection	On-board CV Electronic Data, On-board CV Safety and Security	

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)	ExC Cap.
safety inspection record	On-board CV Electronic Data, On-board CV Safety and Security	Roadside Safety and Security Inspection	
safety inspection report	CV Safety and Security Administration	Roadside Safety and Security Inspection	
safety inspection report	CV Safety and Security Administration	Fleet Administration	
safety inspection report	CV Safety and Security Administration	(Other CVAS)	
safety inspection report	Roadside Safety and Security Inspection	CV Safety and Security Administration	
safety inspection report	(Other CVAS)	CV Safety and Security Administration	
safety inspection request	Roadside Safety and Security Inspection	On-board CV Electronic Data, On-board CV Safety and Security	
safety status information	CV Information Exchange, CV Safety and Security Administration	Roadside Electronic Screening, Roadside Safety and Security Inspection	
safety status information	CV Information Exchange	(CVOIR)	
safety status information	CV Information Exchange	Fleet Administration	
safety status information	CV Information Exchange, CV Safety and Security Administration	(Other CVAS)	
safety status information	(Other CVAS)	CV Information Exchange, CV Safety and Security Administration	
screening event record	Roadside Electronic Screening, Roadside WIM	On-board CV Electronic Data	
screening event record	On-board CV Electronic Data	Roadside Electronic Screening, Roadside WIM	
screening results	CV Information Exchange, International CV Administration	(BIA)	C9, S3
tag data	On-board CV Safety and Security	Roadside Safety and Security Inspection	
tag data	On-board CV Electronic Data	(BIS)	
tag data	On-board CV Electronic Data	International Border Crossing, Roadside WIM	
tag data	On-board CV Electronic Data	Roadside Electronic Screening, Roadside Safety and Security Inspection	R1

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)	ExC Cap.
tag data	On-board CV Safety and Security	Roadside Safety and Security Inspection	
tax filing	Fleet Credentials & Taxes Management & Reporting	Credentials and Taxes Administration	
toll data	Infrastructure Provided Trip Planning – ISP	Fleet Administration	
toll data	Toll Administration – TAS	Fleet Administration	
toll data request	Fleet Administration	Infrastructure Provided Trip Planning – ISP	
toll data request	Fleet Administration	Toll Administration – TAS	
traffic images	TMC Incident Detection – TMS, TMC Incident Dispatch Coordination/Communication – TMS	(BIS)	
transaction status	(FI)	Credentials and Taxes Administration	
transportation border clearance assessment	International CV Administration	International Border Crossing	
trip declaration identifiers	International CV Administration	International Border Crossing	
trip identification number	Freight Administration and Management	On-board CV Electronic Data	
trip identification number	(IFS)	On-board CV Electronic Data	
trip identification number input	(CV Driver)	On-board CV Electronic Data	
trip log	On-board Trip Monitoring	Fleet Administration	
trip log information	On-board Trip Monitoring	(CV Driver)	
trip log request	Fleet Administration	On-board Trip Monitoring	
violation notification	CV Safety and Security Administration	(EA)	
violation notification	Citation and Accident Electronic Recording	CV Safety and Security Administration	

Table 3 shows the architecture flows related to the new Vehicle Subsystem and Driver Terminator Interfaces diagram (Figure 2–3) and their source/destination equipment packages (EPs). The vehicle subsystem is implied and not explicitly called out; all other subsystems and terminators are specified. This table is new in V4.0 (CR 6320).

Table 3. CVISN Architecture Flows – Vehicle Subsystem and Driver Terminator (Equipment Packages)

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)
access permission	Field Barrier System Control – RS	Vehicle Secure Area Access System
access request	Vehicle Secure Area Access System	Field Barrier System Control – RS
automated vehicle control data	Roadway Automated Vehicle Operations – RS	Vehicle Automated Operations
automated vehicle status	Vehicle Automated Operations	Roadway Automated Vehicle Operations – RS
basic vehicle measures	(BV)	Driver Safety Monitoring System, Vehicle Automated Operations, Vehicle Environmental Probe Support, Vehicle Intersection Control, Vehicle Intersection Safety Warning, Vehicle Lateral Control, Vehicle Lateral Warning System, Vehicle Longitudinal Control, Vehicle Longitudinal Warning System, Vehicle Mayday I/F, Vehicle On-board Diagnostics System, Vehicle Pre-Crash Safety Systems, Vehicle Safety Monitoring System, Vehicle Traffic Probe Support, Vehicle Warning System
broadcast traveler information	Basic Information Broadcast – ISP	Basic Vehicle Reception, Vehicle Autonomous Route Guidance
broadcast traveler information	Roadway Short Range Traveler Information Communications – RS	Vehicle Short Range Traveler Reception
commercial vehicle data	On-board Cargo Monitoring – CVS	Vehicle Mayday I/F
commercial vehicle data request	Vehicle Mayday I/F	On-board Cargo Monitoring – CVS
driver information	MCV Vehicle Safety Monitoring – MCVS	(Driver)

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)
driver information	Advanced Rail Crossing – RS, Multimodal Crossing Control – RS, Roadway Emissions Monitoring – RS, Roadway Freeway Control – RS, Roadway Intersection Safety Warning – RS, Roadway Signal Controls – RS, Roadway Speed Monitoring – RS, Roadway Traffic Information Dissemination – RS, Roadway Work Zone Safety – RS, Roadway Work Zone Traffic Control – RS, Standard Rail Crossing – RS	(Driver)
driver inputs	(Driver)	Basic Vehicle Reception, Driver Safety Monitoring System, Driver Visibility Improvement System, Interactive Vehicle Reception, Vehicle Automated Operations, Vehicle Autonomous Route Guidance, Vehicle Intersection Control, Vehicle Intersection Safety Warning, Vehicle Lateral Control, Vehicle Lateral Warning System, Vehicle Longitudinal Control, Vehicle Longitudinal Warning System, Vehicle Secure Area Access System, Vehicle Short Range Traveler Information Reception, Vehicle Trip Planning and Route Guidance, Vehicle Warning System
driver parking information	Parking Management – PMS	(Driver)

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)
driver updates	Basic Vehicle Reception, Driver Safety Monitoring System, Driver Visibility Improvement System, Interactive Vehicle Reception, Vehicle Automated Operations, Vehicle Autonomous Route Guidance, Vehicle Intersection Control, Vehicle Intersection Safety Warning, Vehicle Lateral Control, Vehicle Lateral Warning System, Vehicle Longitudinal Control, Vehicle Longitudinal Warning System, Vehicle Mayday I/F, Vehicle On-board Diagnostics System, Vehicle Safety Monitoring System, Vehicle Secure Area Access System, Vehicle Short Range Traveler Information Reception, Vehicle Traffic Probe Support, Vehicle Trip Planning and Route Guidance, Vehicle Warning System	(Driver)
emergency acknowledge	Mayday Support – EMS	Vehicle Mayday I/F
emergency data request	Mayday Support – EMS	Vehicle Mayday I/F
emergency notification	Vehicle Mayday I/F	Mayday Support – EMS
emergency traveler information	ISP Emergency Traveler Information – ISP	Basic Vehicle Reception, Interactive Vehicle Reception
emergency traveler information	Roadway Short Range Traveler Communications – RS	Vehicle Short Range Traveler Reception
emergency traveler information request	Interactive Vehicle Reception	ISP Emergency Traveler Information – ISP
emergency vehicle alert	On-board EV En Route Support – EVS	Vehicle Warning System
environmental conditions	(Roadway Environment)	Vehicle Environmental Probe Support
environmental probe data	Vehicle Environmental Probe Support	ISP Probe Information Collection – ISP

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)
environmental probe data	Vehicle Environmental Probe Support	Roadway Probe Data Communications – RS
interactive traveler information	Interactive Infrastructure Information – ISP	Interactive Vehicle Reception
intersection status	Roadway Intersection Safety Warning – RS	Vehicle Intersection Control, Vehicle Intersection Safety Warning
in-vehicle transaction status	Vehicle Toll/Parking Interface	(Driver)
map update request	Vehicle Autonomous Route Guidance, Vehicle Location Determination, Vehicle Trip Planning and Route Guidance	(MUP)
map updates	(MUP)	Vehicle Autonomous Route Guidance, Vehicle Location Determination, Vehicle Trip Planning and Route Guidance
payment	(TC)	Vehicle Toll/Parking Interface
physical presence	(Potential Obstacles)	Vehicle Automated Operations, Vehicle Intersection Control, Vehicle Intersection Safety Warning, Vehicle Lateral Control, Vehicle Lateral Warning System, Vehicle Longitudinal Control, Vehicle Longitudinal Warning System, Vehicle Pre-Crash Safety Systems
position fix	(LDS)	Vehicle Location Determination
probe archive date	Vehicle Traffic Probe Support	Roadway Probe Data Communications – RS
request for payment	Vehicle Toll/Parking Interface	(TC)
request for service	(Driver)	Vehicle Mayday I/F, Vehicle Toll/Parking Interface
roadside transaction status	Parking Electronic Payment – PMS	(Driver)
roadside transaction status	Toll Plaza Toll Collection – TCS	(Driver)

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)
roadway characteristics	(Roadway Environment)	Driver Visibility Improvement System, Vehicle Automated Operations, Vehicle Environmental Probe Support, Vehicle Lateral Control, Vehicle Lateral Warning System, Vehicle Longitudinal Control, Vehicle Longitudinal Warning System, Vehicle Warning System
roadway safety data	Roadway Safety Warning System – RS	Vehicle Warning System
safety system status	Vehicle Safety Monitoring System	MCV Roadway Maintenance and Construction – MCVS, MCV Vehicle Monitoring and Diagnostics – MCVS, MCV Winter Maintenance – MCVS
traffic probe data	Vehicle Traffic Probe Support	ISP Probe Information Collection – ISP
traffic probe data	Vehicle Traffic Probe Support	Roadway Probe Data Communications – RS
traveler alerts	ISP Traveler Information Alerts – ISP	Interactive Vehicle Reception
traveler profile	Interactive Vehicle Reception	Interactive Infrastructure Information – ISP, ISP Traveler Information Alerts – ISP, Infrastructure Provided Yellow Pages and Reservation – ISP
traveler profile	Vehicle Trip Planning and Route Guidance	Infrastructure Provided Trip Planning – ISP
traveler request	Interactive Vehicle Reception	Interactive Infrastructure Information – ISP
trip confirmation	Vehicle Trip Planning and Route Guidance	Infrastructure Provided Dynamic Ride Sharing – ISP, Infrastructure Provided Trip Planning – ISP
trip plan	Infrastructure Provided Dynamic Ride Sharing – ISP, Infrastructure Provided Trip Planning – ISP	Vehicle Trip Planning and Route Guidance

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)
trip request	Vehicle Trip Planning and Route Guidance	Infrastructure Provided Dynamic Ride Sharing – ISP, Infrastructure Provided Trip Planning – ISP
vehicle control	Vehicle Automated Operations, Vehicle Intersection Control, Vehicle Lateral Control, Vehicle Longitudinal Control	(BV)
vehicle control coordination	(Other Vehicle)	Vehicle Automated Operations
vehicle control coordination	Vehicle Automated Operations	(Other Vehicle)
vehicle diagnostics data	Vehicle On-board Diagnostics System	Roadway Emissions Monitoring – RS
vehicle intersection safety data	(Other Vehicle)	Vehicle Intersection Control, Vehicle Intersection Safety Warning
vehicle intersection safety data	Vehicle Intersection Control, Vehicle Intersection Safety Warning	(Other Vehicle)
vehicle intersection safety data	Vehicle Intersection Control, Vehicle Intersection Safety Warning	Roadway Intersection Safety Warning – RS
vehicle occupancy	Vehicle Traffic Probe Support	Roadway HOV Control – RS
vehicle parking information	Parking Short Range Traveler Information Communications – PMS	Vehicle Short Range Traveler Information Reception
vehicle payment information	Vehicle Toll/Parking Interface	Parking Electronic Payment – PMS
vehicle payment information	Vehicle Toll/Parking Interface	Toll Plaza Toll Collection – TCS
vehicle payment request	Parking Electronic Payment – PMS	Vehicle Toll/Parking Interface
vehicle payment request	Toll Plaza Toll Collection – TCS	Vehicle Toll/Parking Interface
vehicle payment update	Parking Electronic Payment – PMS	Vehicle Toll/Parking Interface
vehicle payment update	Toll Plaza Toll Collection – TCS	Vehicle Toll/Parking Interface
vehicle safety data	(Other Vehicle)	Vehicle Pre-Crash Safety Systems, Vehicle Warning System
vehicle safety data	Vehicle Pre-Crash Safety Systems, Vehicle Warning System	(Other Vehicle)
vehicle safety data	Vehicle Warning System	Roadway Safety Warning System – RS
vehicle signage data	On-board EV Incident Management Communication – EVS	Vehicle Short Range Traveler Information Reception
vehicle signage data	MCV Vehicle Safety Monitoring – MCVS	Vehicle Short Range Traveler Information Reception

Flow Name	Source EP (or Terminator)	Destination EP (or Terminator)
vehicle signage data	Roadway Short Range Traveler Information Communications – RS, Roadway Work Zone Safety – RS	Vehicle Short Range Traveler Information Reception
vehicle signage data	Roadway Emissions Monitoring – RS	Vehicle On-board Diagnostics System
vehicle signage data	Advanced Rail Crossing – RS, Roadway Speed Monitoring – RS, Roadway Work Zone Safety – RS	Vehicle Short Range Traveler Information Reception
vehicle signage data	On-board Transit In Vehicle Signing Communications – TVS	Vehicle Short Range Traveler Information Reception
yellow pages information	Infrastructure Provided Yellow Pages and Information – ISP	Interactive Vehicle Reception
yellow pages request	Interactive Vehicle Reception	Infrastructure Provided Yellow Pages and Information – ISP

Table 4 defines the architecture flow names. All flow definitions are from the National ITS Architecture Version 6.1 (Reference [6]).

Table 4. CVISN Architecture Flow Names and Descriptions

Flow Name	Flow Description	CR #
access permission	Information returned indicating whether permission for access is granted and instructions for proceeding.	CR6320
access request	Request for access to an access-controlled transportation facility.	CR6320
accident report	Report of commercial vehicle safety accident. The information may be provided as a response to a real-time query or proactively by the source. The query flow is not explicitly shown.	
alarm	Information about a Commercial Vehicle or Freight Equipment breach, non-permitted security sensitive hazmat detected at the roadside, route deviation, or Commercial Vehicle Driver / Commercial Vehicle / Freight Equipment assignment mismatches which includes the location of the Commercial Vehicle and appropriate identities.	
alert response	This flow represents the tactile or auditory interface with ITS equipment containing the response by a Commercial Vehicle Driver or Fleet-Freight Manager that confirms or cancels an alert.	
alerts	This flow represents the visual or auditory interface with ITS equipment containing specific alerts and messages related to commercial vehicles (e.g. trucks not advised, trucks over 10 tons not allowed on bridge, route details). This also includes detected route deviations and warning indications detected by on-board sensors (e.g., safety) and freight equipment sensors (e.g., breach, cargo).	
alerts and advisories	Assessments (general incident and vulnerability awareness information), advisories (identification of threats or recommendations to increase preparedness levels), and alerts (information on imminent or in-progress emergencies). This flow also provides supporting descriptive detail on incidents, threats, and vulnerabilities to increase preparedness and support effective response to threats against the surface transportation system.	
archive requests	A request to a data source for information on available data (i.e., "catalog") or a request that defines the data to be archived. The request can be a general subscription intended to initiate a continuous or regular data stream or a specific request intended to initiate a one-time response from the recipient.	

Flow Name	Flow Description	CR #
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.	
arrival notification	Notification of arrival (and departure) of a motor vehicle at the inspection station.	CR6318
audit data	Information to support a tax audit.	
automated vehicle control data	Instructions and control parameters for automated vehicle operation including current system conditions and advisories, control parameters (e.g., speed and performance profiles, headways), maneuver coordination, and check in/checkout instructions.	CR6320
automated vehicle status	Data provided by an automated vehicle identifying it's current mode and operational status, current position and motion, preferred route, and information provided to support checking/checkout and coordinated maneuvers while on the automated facility.	CR6320
basic vehicle measures	Information provided to on-board ITS equipment from the vehicle platform indicating current vehicle status.	CR6320
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.	
border agency clearance results	Notification regarding the granting of permission for commercial freight shipment to enter the U.S.	
border clearance data	Trip specific data regarding the movement of goods across international borders. Includes trip identification number. May also include results from recent border crossing screening events.	
border clearance data request	Request for trip specific data regarding the movement of goods across international borders. Includes trip identification number. May also include results from recent border crossing screening events.	
border clearance event	Reports clearance event data regarding action taken at border, including acceptance or override of system decision, and date/time stamp.	
border clearance status	Notification regarding the crossing status of commercial freight shipment scheduled to enter the U.S. Includes portions of border agency and transportation agency clearance results, as they become available.	CR6410
border crossing status information	Port of entry status including current wait-times.	CR6318
border incident information	Notification of existence of incident in the vicinity of the border. Information would include expected severity, location, time and nature of incident. As additional information is gathered and the incident evolves, updated incident information is provided.	CR6318

Flow Name	Flow Description	CR #
border incident response status	Status of the current incident response at a border crossing, 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.	CR6318
border information archive data	Border inspection activities data. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.	CR6318
border pass/pull-in	Command to commercial vehicle to pull into or bypass border inspection station.	CR6318
breach response	This is an Intermodal Freight Shipper's response to a breach or tamper event of their freight equipment. There may be instructions for handling of the shipment, possible re-routing or pickup.	
broadcast traveler information	General traveler information that contains traffic and road conditions, link travel times, incidents, advisories, restrictions, transit service information, weather information, parking information, and other related traveler information.	CR6320
citation	Report of commercial vehicle citation. The citation includes references to the statute(s) that was (were) violated. It includes information on the violator and the officer issuing the citation. A citation differs from a violation because it is adjudicated by the courts. The information may be provided as a response to a real-time query or proactively by the source. The query flow is not explicitly shown.	
clearance notification	Notification that cargo has been cleared through customs.	CR6318
client id	A common identification number that can be used by all BIFA agencies and organizations to reference the carrier.	CR6318
client verification information	Information about carriers who have made border credential applications such as commercial driver’s license information and carrier safety status.	CR6318
client verification request	Request for information such as commercial driver’s license information and carrier safety status.	CR6318
commercial vehicle archive data	Information describing commercial vehicle travel and commodity flow characteristics. Content may include a catalog of available information, the actual information to be archived, and associated meta data that describes the archived information.	
commercial vehicle breach	Information about a breach or tamper event on a Commercial Vehicle or its attached freight equipment which includes identity, type of breach, location, and time.	
commercial vehicle data	Information about the commercial vehicles cargo, credentials, and payments.	CR6320
commercial vehicle data request	Requests from the vehicle for information about the commercial vehicle's cargo, credentials, and payments.	CR6320

Flow Name	Flow Description	CR #
commercial vehicle disable	This flow safely disables a specific commercial vehicle.	
commercial vehicle disable status	This flow provides the status of the disable flag in the commercial vehicle.	CR4966
commercial vehicle measures	Commercial vehicle and driver status measured by on-board ITS equipment.	
compliance review report	Report containing results of carrier compliance review, including concomitant out-of-service notifications, carrier warnings/notifications. The information may be provided as a response to a real-time query or proactively by the source. The query flow is not explicitly shown.	
credential application	Application for commercial vehicle credentials. Authorization for payment is included.	
credential fee coordination	Jurisdiction's rates for various credentials (IRP, IFTA, etc.) that are exchanged between agencies.	
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 asset 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 credential	Driver information (e.g., identity, biometrics, address, date of birth, endorsements, restrictions) stored on a driver’s license or other official identification card used to identify a driver of commercial vehicles.	
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.	
cv driver record request	A request for information about a commercial vehicle driver.	
cv repair status	Information about the completion of a repair to a commercial vehicle.	

Flow Name	Flow Description	CR #
CVO driver initialization	This flow represents the tactile or auditory interface with ITS equipment containing the commercial vehicle driver and vehicle information. This flow contains inquiries to the commercial vehicle managing system.	
CVO pass/pull-in message	This flow represents the visual or auditory interface with ITS equipment containing a message sent to commercial vehicle driver indicating whether to bypass or requesting pull in to inspection/verification stop along with inspection results (e.g., LED indicator on transponder or variable message sign).	
CVO weight and presence	Physical attribute of commercial vehicle that can be measured (for example, weight, number of axles, axle spacing, etc.).	
daily site activity data	Record of daily activities at commercial vehicle check stations including summaries of screening events and inspections.	
disable commercial vehicle	A request that a specific commercial vehicle should be safely disabled.	
driver alert response	Commercial Vehicle Driver response to a breach alert for a Freight Equipment breach or tamper event.	
driver identity characteristics	The physical or visible characteristics of a commercial vehicle driver that can be measured to uniquely identify a driver. Could be an Identification Card with a Personal Identification Number, biometrics, or visual verification by an operator.	
driver information	General advisory and traffic control information provided to the driver while en route.	CR6320
driver inputs	Driver input to the vehicle including configuration data, settings and preferences, interactive requests, and control commands.	CR6320
driver log	A daily log showing hours in service for the current driver.	
driver log request	Request for driver log data.	
driver parking information	Presentation of general parking information to drivers including lot status, parking availability, and directions to available spaces, entrances, and exits.	CR6320
driver to fleet request	Requests from the driver and vehicle for routing, payment, and enrollment information.	
driver updates	Information displayed or otherwise conveyed by the vehicle to the driver.	CR6320
electronic lock data	Notification to roadside (via transponder) of the presence and status of electronic cargo locks.	
electronic lock data request	Request from roadside for data regarding presence and status of electronic cargo locks.	
electronic screening request	Request for identification data to support electronic screening.	
emergency acknowledge	Acknowledge request for emergency assistance and provide additional details regarding actions and verification requirements.	

Flow Name	Flow Description	CR #
emergency data request	A request for additional information or a control command issued by the emergency response agency in response to an emergency request for assistance from a traveler.	
emergency notification	An emergency request for assistance automatically initiated by a vehicle or originated by a traveler using an in-vehicle or personal device.	
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.	CR6320
emergency traveler information request	Request for alerts, evacuation information, and other emergency information provided to the traveling public.	CR6320
emergency vehicle alert	Notification to vehicles in the area that an emergency vehicle is in the vicinity. The number of responding vehicles, their status, location, speed, and direction are provided.	CR6320
environmental conditions	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) that are measured by environmental sensors.	CR6320
environmental probe data	Data from vehicle safety and convenience systems that can be used to estimate environmental conditions, including 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. Both current data and snapshots of recent events (e.g., traction control or anti-lock brake system activations) may be reported.	CR6320
expected driver identity characteristics	Driver identification information, e.g., encrypted PIN codes issued to drivers, encrypted driver biometric parameters.	
expedited clearance information	Includes carrier ID, importer ID, broker ID, conveyance ID, driver ID, service options, and associated information that is used to support expedited border clearance.	CR6318
expedited clearance registration	Registration of the importer, carrier, conveyance, and driver, as applicable, for border clearance programs such as FAST, Customs Self Assessment (Canada), C-TPAT (US), PIP (Canada), ACI (Canada), and ACE (US). Includes electronic filing of forms and associated payment.	CR6318
expedited clearance status	Status of expedited clearance registration.	CR6318

Flow Name	Flow Description	CR #
fleet and freight threat information	Information about threats detected by commercial vehicle fleet and freight operators. The threats include incidents involving commercial vehicles (i.e., hijacking), unusual activities observed by commercial vehicle operators (i.e., truck parked under a bridge), and incidents involving freight equipment (i.e., freight equipment tampering).	
fleet to driver update	Updated instructions to the driver including dispatch, routing, and special instructions.	
freight breach	Information about a breach or tamper event on Freight Equipment which includes identity, type of breach, location, and time.	
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, Bill of Lading, and sensor status.	
freight monitoring parameters	Parameters to configure the Freight Equipment for event reporting and keep alive functions.	
freight transport booking	Booking information for the transport of freight that includes company, contact information, point of origin, pick-up location, drop-off location, and freight equipment identifier.	
freight transportation status	A time-stamped status of a freight shipment as it passes through the supply chain from manufacturer through arrival at its final destination; including cargo movement logs, routing information, and cargo IDs.	CR6333
hazmat environmental factors	Sensed characteristics of a vehicle that are analyzed to indicate if the vehicle is carrying a security sensitive substance, e.g., detection of radiation or ammonia compounds.	
hazmat information	Information about a particular hazmat load including nature of the load and unloading instructions. May also include hazmat vehicle route and route update information.	
hazmat information request	Request for information about a particular hazmat load.	
hazmat spill notification	Information provided to emergency response organizations when cargo sensors detect a release of hazardous material. This information will include sensor information, vehicle location and identification, and carrier identification.	
identification information	The physical characteristics of a commercial vehicle that can be used to determine a vehicle's identity, such as a license plate number, USDOT number, ICC number, bar code, etc.	
identities	Identification information for the Commercial Vehicle (e.g., license plate number or USDOT number), Freight Equipment (e.g., container, chassis, or trailer identification), and Driver.	

Flow Name	Flow Description	CR #
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.	CR6321
information on violators	Information on violators provided by a law enforcement agency. May include information about commercial vehicle violations or other kinds of violations associated with the particular entity. The information may be provided as a response to a real-time query or proactively by the source. The query flow is not explicitly shown.	
inspection results	Report of results of border inspection on a particular load.	CR6318
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.	CR6318
intermodal freight event information	Plans for movement of intermodal freight from the depot area possibly impacting traffic. May also include requests for special treatment at traffic signals.	CR6318
intermodal freight traffic confirmation	Confirmation that details concerning the movement of intermodal freight on the roadway network have been received and processed. May also include information on traffic conditions affecting the depot.	CR6318
intersection status	Intersection status including current operational status, signal phase and timing information, intersection geometry, surface conditions, warnings of potential violations or hazardous conditions, and approaching vehicle information. This may include information about the position, velocity, acceleration, and turning status of approaching vehicles.	CR6319 CR6320
in-vehicle transaction status	The status of an electronic payment transaction presented to the driver by in-vehicle equipment.	CR6320
lane management inputs	This flow provides inputs to traffic operations dynamic message signs on the types of vehicles to allow in each lane as well as other lane management messages that might be used by traffic operations.	CR6318
manifest data	Identifies Port of Entry, date, and information on carrier and goods, origin, etc.	CR6318
manifest receipt confirmation	Confirmation that a shipper’s manifest has been received.	CR6318
map update request	Request for a map update which could include a new underlying map or map layer updates.	

Flow Name	Flow Description	CR #
map updates	Map update which could include a new underlying static or real-time map or map layer(s) update.	
on-board safety data	Safety data measured by on-board sensors. Includes information about the vehicle, vehicle components, cargo, and driver.	
on-board safety request	Request for on-board vehicle safety data by the roadside equipment.	
on-board vehicle data	Information about the commercial vehicle stored on-board (for maintenance purposes, gate access, cargo status, lock status, etc.).	
on-board vehicle request	Request for on-board vehicle data.	
pass/pull-in	Command to commercial vehicle to pull into or bypass inspection station.	
payment	Payment of some kind (e.g., toll, parking, fare) by traveler, which, in most cases, can be related to a credit account.	
payment request	Request for payment from financial institution.	
physical presence	Detection of an obstacle by a vehicle. Obstacle could include animals, other vehicles, pedestrians, rocks in roadway etc.	CR6320
position fix	Information which provides a traveler's or vehicle's geographical position.	
pre-arrival notification	Identification of a vehicle or driver that is approaching a border crossing.	CR6318
probe archive data	Probe data that allows calculation of travel times, volumes, and other measures that support transportation planning. Optionally, this flow also includes origin and destination information for vehicles that opt to provide this information.	CR6320
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.	CR6318
request for payment	Request to deduct cost of service from user's payment account.	
request for service	Driver inputs that summon an emergency response, request a financial transaction, or initiate other services.	CR6320
request tag data	Request for tag information including credit identity, stored value card cash, etc.	
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 architecture flow. Information on diversions and alternate routes, closures, and special traffic restrictions (lane/shoulder use, weight restrictions, width restrictions, HOV requirements) in effect is also included along with a definition of the links, nodes, and routes that make up the road network.	CR6319
roadside transaction status	The status of an electronic payment transaction provided directly to the driver via sign or other roadside infrastructure.	CR6320

Flow Name	Flow Description	CR #
roadway characteristics	Detectable or measurable road characteristics such as friction coefficient and general surface conditions, road geometry and markings, etc. These characteristics are monitored or measured by ITS sensors and used to support advanced vehicle safety and control and road maintenance capabilities.	CR6320
roadway safety data	Information about potential safety hazards in the vehicle path such as stalled vehicles, wrong way drivers, debris, or standing water.	CR6320
route deviation alert	An alert that indicates a deviation from a planned route has been detected. The alert will contain the current Commercial Vehicle location and identity.	
route plan	Tailored route provided by ISP in response to a specific request.	
route request	Request for a tailored route based on given constraints.	
route restrictions	Information about routes, road segments, and areas that do not allow the transport of security sensitive hazmat cargoes or include other restrictions (such as height or weight limits).	
safe vehicle disable	Control signal disabling or enabling commercial vehicle.	
safety inspection record	Record containing results of commercial vehicle safety inspection.	
safety inspection report	Report containing results of commercial vehicle safety inspection. The information may be provided as a response to a real-time query or proactively by the source. The query flow is not explicitly shown.	
safety inspection request	Request for safety inspection record.	
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.	
safety system status	Current vehicle safety system status indicating the operating condition of these systems and the safety status of the vehicle and driver.	CR6320
screening event record	Results of CVO electronic screening activity.	
screening results	Results of commercial vehicle screening event at a border crossing - reports clearance event data regarding action taken at border, including acceptance or override of system decision, and date/time stamp.	CR6318
tag data	Unique tag ID and related vehicle information.	
tax filing	Commercial vehicle tax filing data. Authorization for payment is included.	

Flow Name	Flow Description	CR #
toll data	Current toll schedules for different types of vehicles as well as advanced toll payment information.	
toll data request	Request made to obtain toll schedule information or pay a toll in advance. The request can be a subscription that initiates as-needed information updates as well as a one-time request for information.	
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 and the operational status of the surveillance system.	CR6318
traffic probe data	Vehicle data that is used to determine traffic conditions. In a basic implementation, the data could be limited to time stamped unique identifiers that can be used to measure a vehicle's progress through the network. In more advanced implementations, the vehicle may report current position, speed, and heading and snapshots of recent events including route information, starts and stops, speed changes, and other information that can be used to estimate traffic conditions.	CR6320
transaction status	Response to transaction request. Normally dealing with a request for payment.	
transportation border clearance assessment	Includes directions for commercial driver to proceed to nearest vehicle weigh and inspection station for further review if required.	CR6411
traveler alerts	Traveler information alerts reporting congestion, incidents, adverse road or weather conditions, 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.	CR6320 CR6321
traveler profile	Information about a traveler including equipment capabilities, personal preferences, and traveler alert subscriptions.	CR6320 CR6321
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.	CR6320
trip confirmation	Acknowledgement by the driver/traveler of acceptance of a trip plan with associated personal and payment information required to confirm reservations.	CR6320
trip declaration identifiers	Specific identifiers extracted from notification containing information regarding pending commercial freight shipment into the U.S. Includes carrier, vehicle, and driver identification data.	
trip identification number	The unique trip load number for a specific cross-border shipment.	
trip identification number input	Commercial vehicle driver input containing the unique trip load number for a specific cross-border shipment.	CR6318

Flow Name	Flow Description	CR #
trip log	Driver's daily log, vehicle location, mileage, and trip activity (includes screening, inspection and border clearance event data as well as fare payments).	
trip log information	This flow represents the tactile or auditory interface with ITS equipment containing the information entered into the trip log, or request for update.	
trip log request	Request for trip log.	
trip plan	A travel itinerary identifying a route and associated traveler information and instructions identifying recommended modes and transfer information, ride sharing options, and transit and parking reservation information.	CR6320
trip request	Request for trip planning services that identifies the trip origin, destination(s), timing, preferences, and constraints. The request may also include a request for transit and parking reservations and ridesharing options associated with the trip.	CR6320
vehicle control	Vehicular control commands	CR6320
vehicle control coordination	Coordination of control commands between leader and follower vehicles allowing vehicles to join and separate from groups of cooperative vehicles, sharing performance capabilities, and coordinating maneuvers between lead and following vehicles.	CR6320
vehicle diagnostics data	Information about the vehicle and its current operational status that supports vehicle performance monitoring, service, and repair. The flow identifies the vehicle and vehicle type and provides information about the vehicle's current operational status, the current performance of engine-related components, and notification of any identified malfunctions.	CR6320
vehicle intersection safety data	Vehicle path and acceleration data provided by vehicles approaching or occupying an intersection. It identifies the intersection, vehicle position and motion, the anticipated lane and movement that will be used in the intersection, and notification of potential violations or other detected safety hazards.	CR6319 CR6320
vehicle occupancy	The number of occupants detected by the vehicle.	CR6320
vehicle parking information	Parking information for in-vehicle display that is provided to vehicles approaching or in parking facilities. The information provided would include static sign information (e.g., guide signs, service signs, height, width, and weight restrictions, and directional signs) and dynamic information (e.g., current parking availability and locations).	CR6320
vehicle payment information	Information provided for payment of tolls and parking 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.	CR6320
vehicle payment request	Request for information supporting toll and parking payments.	CR6320
vehicle payment update	Data written to vehicle equipment to support electronic toll collection or parking payment.	CR6320

Flow Name	Flow Description	CR #
vehicle safety data	Vehicle safety data indicating vehicle location, vehicle motion (speed, heading, acceleration), vehicle control (brakes, steering, throttle, exterior lights), basic vehicle characteristics (length, width). May also include additional vehicle status (e.g., anti-lock brake activation, stability control system activation).	CR6320
vehicle signage data	In-vehicle signing data that augments regulatory, warning, and informational road signs and signals. The information provided would include static sign information (e.g., stop, curve warning, guide signs, service signs, and directional signs) and dynamic information (e.g., current signal states, grade crossing information, local traffic and road conditions, advisories, and detours).	CR6319 CR6320
violation notification	Notification to enforcement agency of a violation. The violation notification flow describes the statute or regulation that was violated and how it was violated (e.g., overweight on specific axle by xxx pounds or which brake was out of adjustment and how far out of adjustment it was). A violation differs from a citation because it is not adjudicated by the courts.	
yellow pages information	Travel service information and reservations for tourist attractions, lodging, dining, service stations, emergency services, and other services and businesses of interest to the traveler.	CR6320
yellow pages request	Request for travel service information including tourist attractions, lodging, restaurants, service stations, and emergency services. The request identifies the type of service, the area of interest, optional reservation request information, parameters that are used to prioritize or filter the returned information, and sorting preferences.	CR6320

Table 5 presents the definitions for subsystems and terminators. All definitions are from National ITS Architecture Version 6.1 (Reference [6]).

Table 5. Subsystem and Terminator Descriptions

Subsystem and Terminator Descriptions		
Subsystem/ Terminator	**Updated Description**	**CR #**
Alerting and Advisory Systems	This terminator represents the federal, state, and local alerting and advisory systems that provide alerts, advisories, and other potential threat information that is relevant to surface transportation systems. This includes systems such as the Information Sharing and Analysis Centers (ISACS), the National Infrastructure Protection Center (NIPC), the Homeland Security Advisory System (HSAS), and other systems that provide intelligence about potential, imminent, or actual attacks on the transportation infrastructure or its supporting information systems. This terminator also represents the early warning and emergency alert systems operated by federal, state, county, and local agencies that provide advisories and alerts regarding all types of emergencies including natural hazards (floods, hurricanes, tornados, earthquakes), accidents (chemical spills, nuclear power plant emergencies) and other civil emergencies such as child abduction alerts that impact transportation system operation and/or require immediate public notification. Note that weather related watches and warnings, such as those issued by the National Hurricane Center, are provided by both this terminator and the Weather Service terminator since many alerting and advisory systems and the National Weather Service both provide severe weather and related hazards information. The alerts and advisories that are provided by the systems represented by this terminator are based on analysis of potential threat information that is collected from a variety of sources, including information collected by ITS systems. The bidirectional interface with this terminator allows potential threat information that is collected by ITS systems to be provided to the alerting and advisory systems to improve their ability to identify threats and provide useful and timely information. The types of information provided by this terminator include general assessments and incident awareness information, advisories that identify potential threats or recommendations to increase preparedness levels, alerts regarding imminent or in-	

Subsystem and Terminator Descriptions		
Subsystem/ Terminator	**Updated Description**	**CR #**
	progress emergencies, and specific threat information such as visual imagery used for biometric image processing.	
Archived Data Management (ADMS)	The Archived Data Management Subsystem collects, archives, manages, and distributes data generated from ITS sources for use in transportation administration, policy evaluation, safety, planning, performance monitoring, program assessment, operations, and research applications. The data received is formatted and tagged with attributes that define the data source, conditions under which it was collected, data transformations, and other information (i.e., meta data) necessary to interpret the data. The subsystem can fuse ITS generated data with data from non-ITS sources and other archives to generate information products utilizing data from multiple functional areas, modes, and jurisdictions. The subsystem prepares data products that can serve as inputs to federal, state, and local data reporting systems. This subsystem may be implemented in many different ways. It may reside within an operational center and provide focused access to a particular agency's data archives. Alternatively, it may operate as a distinct center that collects data from multiple agencies and sources and provides a general data warehouse service for a region.	
Basic Vehicle	This terminator represents the basic vehicle platform that interfaces with and hosts ITS electronics. The Basic Vehicle terminator provides an interface to drive train, driver convenience and entertainment systems, and other non-ITS electronics on-board the vehicle. This interface allows general vehicle systems (e.g., the stereo speaker system) to be shared by ITS and non-ITS systems. It also allows monitoring and control of the vehicle platform for advanced vehicle control system applications.	CR6320
Basic Commercial Vehicle	This terminator represents the motorized commercial vehicle platform that interfaces with and hosts ITS electronics. This terminator represents a vehicle that is used to transport goods which are operated by professional drivers, typically administered as part of a larger fleet, and regulated by a Fleet-Freight Manager. This classification applies to all such vehicles ranging from small panel vans used in local pick-up and delivery services to large, multi-axle tractor-trailer rigs operating on long haul routes.	
Border Inspection Administration (BIA)	This terminator represents back-office systems and databases run by U.S. domestic and foreign governmental agencies responsible for the regulation of trade, and the enforcement of customs and immigration laws. These agencies include U.S. Department of Homeland Security (DHS) and its counterparts in Canada and Mexico. DHS includes components like Customs and Border Protection (CBP),	CR6318

Subsystem and Terminator Descriptions		
Subsystem/ Terminator	**Updated Description**	**CR #**
	Immigration and Customs Enforcement (ICE), and Transportation Security Administration (TSA). Other agencies include secondary trade agencies (e.g., U.S. Food and Drug Administration, U.S. Department of Agriculture, other USDOT departments, etc.), and agencies from other trading nations. The systems they manage coordinate activities related to the border crossings. Data is collected and disseminated to other government systems and users. These systems support import/export cargo processing and enforcement operations at the border, including programs such as FAST, Automated Commercial Environment (ACE), Nexus, and US-VISIT.	
Border Inspection Systems (BIS)	This terminator represents data systems used at the border for the inspection of people or goods. Supports immigration, customs (trade), agricultural, and FDA inspections as applicable. Includes sensors and surveillance systems to identify and classify drivers and their cargo as it approaches a border crossing, the systems used to interface with the back-office administration systems and provide information on status of the crossing or events to other agency systems.	CR6318
Commercial Vehicle Administration (CVAS)	The Commercial Vehicle Administration Subsystem will operate at one or more fixed locations within a region. This subsystem performs administrative functions supporting credentials, tax, and safety regulations. It issues credentials, collects fees and taxes, and supports enforcement of credential requirements. This subsystem communicates with the Fleet Management Subsystems associated with the motor carriers to process credentials applications and collect fuel taxes, weight/distance taxes, and other taxes and fees associated with commercial vehicle operations. The subsystem also receives applications for, and issues special Oversize/Overweight and HAZMAT permits in coordination with other cognizant authorities. The subsystem coordinates with other Commercial Vehicle Administration Subsystems (in other states/regions) to support nationwide access to credentials and safety information for administration and enforcement functions. This subsystem supports communications with Commercial Vehicle Check Subsystems operating at the roadside to enable credential checking and safety information collection. The collected safety information is processed, stored, and made available to qualified stakeholders to identify carriers and drivers that operate unsafely.	

Subsystem and Terminator Descriptions		
Subsystem/ Terminator	**Updated Description**	**CR #**
Commercial Vehicle Check (CVCS)	The Commercial Vehicle Check Subsystem supports automated vehicle identification at mainline speeds for credential checking, roadside safety inspections, and weigh-in-motion using two-way data exchange. These capabilities include providing warnings to the commercial vehicle drivers, their fleet managers, and proper authorities of any safety problems that have been identified, accessing and examining historical safety data, and automatically deciding whether to allow the vehicle to pass or require it to stop with operator manual override. The Commercial Vehicle Check Subsystem also provides supplemental inspection services to current capabilities by supporting expedited brake inspections, the use of operator hand-held devices, mobile screening sites, on-board safety database access, and the enrollment of vehicles and carriers in the electronic clearance program.	
Commercial Vehicle Driver	This terminator represents the human entity that operates vehicles transporting goods including both long haul trucks and local pick up and delivery vans. This terminator is complementary to the Driver terminator in that it represents those interactions which are unique to Commercial Vehicle Operations. Data flowing from the Commercial Vehicle Driver terminator will include those system inputs specific to Commercial Vehicle Operations, such as information back to the Fleet-Freight Manager. Data flowing to the Commercial Vehicle Driver may include system outputs such as commands to pull into a roadside safety inspection facility. Showing the Driver as a terminator includes the user interface devices within the ITS architecture boundary. The Commercial Vehicle Driver will be expected to interact with the ITS interface devices designed to provide support for their usage.	
Commercial Vehicle Subsystem	This subsystem resides in a commercial vehicle and provides the sensory, processing, storage, and communications functions necessary to support safe and efficient commercial vehicle operations. The Commercial Vehicle Subsystem provides two-way communications between the commercial vehicle drivers, their fleet managers, attached freight equipment, and roadside officials, and provides HAZMAT response teams with timely and accurate cargo contents information after a vehicle incident. This subsystem provides the capability to collect and process vehicle, cargo information from the attached freight equipment, and driver safety data and status and alert the driver whenever there is a potential safety or security problem. Basic identification, security and safety status data are supplied to inspection facilities at mainline speeds. In addition, the subsystem will automatically collect and record mileage, fuel usage, and border crossings.	CR6320

Subsystem and Terminator Descriptions		
Subsystem/ Terminator	**Updated Description**	**CR #**
CVO Information Requestor	This terminator represents any organization or individual requesting information from the CVO Information Exchange network. It typically represents insurance companies requesting safety information on carriers, a driver requesting his/her own driving record, etc.	
Driver	This terminator represents the human entity that operates a licensed vehicle on the roadway. Included are operators of private, Transit, Commercial, and Emergency vehicles where the data being sent or received is not particular to the type of vehicle. Thus this terminator originates driver requests and receives driver information that reflects the interactions which might be useful to all drivers, regardless of vehicle classification. The Driver terminator is the operator of the Basic Vehicle terminator. Information and interactions which are unique to drivers of a specific vehicle type (e.g., fleet interactions with transit, commercial, or emergency vehicle drivers) are covered separately.	CR6320
Driver Identification Card	This terminator represents the portable entity (e.g., a smart card) that enables the transfer of electronic identification information about a driver. This may include license information, biometrics, and other data to identify the driver. Typically, the card will be issued by a government agency (e.g., a state driver licensing agency).	
Emergency Management (EMS)	The Emergency Management Subsystem represents public safety, emergency management, and other allied agency systems that support incident management, disaster response and evacuation, security monitoring, and other security and public safety-oriented ITS applications. The subsystem includes the functions associated with fixed and mobile public safety communications centers including public safety call taker and dispatch centers operated by police (including transit police), fire, and emergency medical services. It includes the functions associated with Emergency Operations Centers that are activated at local, regional, state, and federal levels for emergencies and the portable and transportable systems that support Incident Command System operations at an incident. This subsystem also represents other allied systems including centers associated with towing and recovery, freeway service patrols, HAZMAT response teams, and mayday service providers. The subsystem manages sensor and surveillance equipment used to enhance transportation security of the roadway infrastructure (including bridges, tunnels, interchanges, and other key roadway segments) and the public transportation system (including transit vehicles, public areas such as transit stops and stations, facilities	

Subsystem and Terminator Descriptions		
Subsystem/ Terminator	**Updated Description**	**CR #**
	such as transit yards, and transit infrastructure such as rail, bridges, tunnels, or bus guideways). The subsystem provides security/surveillance services to improve traveler security in public areas not a part of the public transportation system. This subsystem monitors alerts, advisories, and other threat information and prepares for and responds to identified emergencies. It interfaces with other Emergency Management Subsystems to support coordinated emergency response involving multiple agencies. The subsystem stores, coordinates, and utilizes emergency response and evacuation plans to facilitate this coordinated response. As the response progresses, situation information including damage assessments, response status, evacuation information, and resource information are shared to keep all allied agencies appraised of the response. Interface with the Transit Management Subsystem allows coordinated use of transit vehicles to facilitate response to major emergencies and to support evacuation efforts. The Emergency Management Subsystem also provides a focal point for coordination of the emergency and evacuation information that is provided to the traveling public, including wide-area alerts when immediate public notification is warranted. The subsystem tracks and manages emergency vehicle fleets using real-time road network status and routing information from the other center subsystems to aide in selecting the emergency vehicle(s) and routes that will provide the most timely response. Interface with the Traffic Management Subsystem allows strategic coordination in tailoring traffic control to support emergency vehicle ingress and egress, implementation of special traffic restrictions and closures, evacuation traffic control plans, and other special strategies that adapt the transportation system to better meet the unique demands of an emergency.	
Emergency Vehicle (EVS)	This subsystem resides in an emergency vehicle and provides the sensory, processing, storage, and communications functions necessary to support safe and efficient incident response. The subsystem represents a range of vehicles including those operated by police, fire, and emergency medical services. In addition, this subsystem represents other incident response vehicles including towing and recovery vehicles and freeway service patrols. The Emergency Vehicle Subsystem includes two-way communications to support coordinated response to emergencies in accordance with an associated Emergency Management Subsystem. Emergency	

Subsystem and Terminator Descriptions		
Subsystem/ Terminator	**Updated Description**	**CR #**
	vehicles are equipped with automated vehicle location capability for monitoring by vehicle tracking and fleet management functions in the Emergency Management Subsystem. Using these capabilities, the appropriate emergency vehicle to respond to each emergency is determined. Route guidance capabilities within the vehicle enable safe and efficient routing to the emergency. In addition, the emergency vehicle may be equipped to support signal preemption through communications with the Roadway Subsystem.	
Enforcement Agency	This terminator represents the systems that receive reports of violations detected by various ITS facilities including individual vehicle emissions, toll violations, CVO violations, excessive speed in work zones, etc.	
Financial Institution	This terminator represents the organization that handles all electronic fund transfer requests to enable the transfer of funds from the user of the service to the provider of the service. The functions and activities of financial clearinghouses are subsumed by this entity.	
Fleet and Freight Management (FMS)	The Fleet and Freight Management Subsystem provides the capability for commercial drivers and fleet or freight managers to receive real-time routing information and access databases containing vehicle and/or freight equipment locations as well as carrier, vehicle, freight equipment and driver information. In addition, the capability to purchase credentials electronically shall also be provided, with automated and efficient connections to financial institutions and regulatory agencies, along with post-trip automated mileage and fuel usage reporting. The Fleet and Freight Management Subsystem also provides the capability for fleet managers to monitor the safety and security of their commercial vehicle drivers and fleet. The subsystem also supports application for hazmat credentials and makes information about hazmat cargo available to agencies as required. Within this subsystem lies all the functionality associated with subsystems and components necessary to enroll and participate in international goods movement programs aimed at enhancing trade and transportation safety and security.	
Freight Equipment	This terminator represents a freight container, intermodal chassis or trailer and provides information to support safe, secure and efficient freight operations. This terminator provides equipment safety data and status and can alert the appropriate systems of an incident, breach, or tamper event. This terminator provides accurate position information to support in-transit visibility of freight equipment.	

Subsystem and Terminator Descriptions		
Subsystem/ Terminator	**Updated Description**	**CR #**
Information Service Provider (ISP)	This subsystem collects, processes, stores, and disseminates transportation information to system operators and the traveling public. The subsystem can play several different roles in an integrated ITS. In one role, the ISP provides a data collection, fusing, and repackaging function, collecting information from transportation system operators and redistributing this information to other system operators in the region and other ISPs. In this information redistribution role, the ISP provides a bridge between the various transportation systems that produce the information and the other ISPs and their subscribers that use the information. The second role of an ISP is focused on delivery of traveler information to subscribers and the public at large. Information provided includes basic advisories, traffic and road conditions, transit schedule information, yellow pages information, ridematching information, and parking information. The subsystem also provides the capability to provide specific directions to travelers by receiving origin and destination requests from travelers, generating route plans, and returning the calculated plans to the users. In addition to general route planning for travelers, the ISP also supports specialized route planning for vehicle fleets. In this third role, the ISP function may be dedicated to, or even embedded within, the dispatch system. Reservation services are also provided in advanced implementations. The information is provided to the traveler through the Personal Information Access Subsystem, Remote Traveler Support Subsystem, and the Vehicle Subsystem through available communications links. Both basic one-way (broadcast) and personalized two-way information provision are supported. The ISP is most commonly implemented as an Internet web site, but it represents any traveler information distribution service including systems that broadcast digital transportation data (e.g., satellite radio networks) and systems that support distribution through Field-Vehicle Communications networks. The ISP accomplishes these roles using constantly evolving technologies like the Internet (World Wide Web pages), direct broadcast communications (email alerts, pagers, satellite radio network data broadcasts), communications through Field-Vehicle communications networks, etc.	CR6318 CR6319 CR6321

Subsystem and Terminator Descriptions		
Subsystem/ Terminator	**Updated Description**	**CR #**
Intermodal Freight Depot	This terminator represents a depot operated either by a depot manager or an alternate mode freight shipper which represents the point of exchange where freight is moved from one mode to another. The depot has knowledge about activities that may impact travel on roadways such as large groups of trucks entering the highway after unloading a ship or freight train. The depot interfaces to the ITS to coordinate freight movement with Fleet-Freight Managers, gather information on traffic conditions affecting the depot, and to provide information on intermodal freight activities that is pertinent to traffic movement in the surrounding area.	
Intermodal Freight Shipper	This terminator represents organizations that engage in the shipment of freight by multiple means, in addition to road-going trucks. They enable ITS to move goods on routes that require the use of other modes of transportation such as heavy rail, air, sea, etc. This terminator includes third party logistics providers (i.e., brokers, freight forwarders, etc.) that interface with Fleet-Freight Managers to transfer cargo from one mode to another. This definition includes those responsible for the movement of freight across international borders. These entities are responsible for filing required declarations, and have an acute interest in the status of international shipments.	
Location Data Source	This terminator provides accurate position information. Systems, which use GPS, terrestrial trilateration, or driver inputs, are all potential examples of Location Data Sources. This terminator contains sensors such as radio position receivers (e.g., GPS) and/or dead reckoning sensors (e.g., odometer, differential odometer, magnetic compass, gyro, etc.). This terminator implies that some additional functionality associated with developing an absolute position is outside the system and will not be directly modeled by the logical or physical architecture representations of the system.	
Maintenance and Construction Management	The Maintenance and Construction Management Subsystem monitors and manages roadway infrastructure construction and maintenance activities. Representing both public agencies and private contractors that provide these functions, this subsystem manages fleets of maintenance, construction, or special service vehicles (e.g., snow and ice control equipment). The subsystem receives a wide range of status information from these vehicles and performs vehicle dispatch, routing, and resource management for the vehicle fleets and associated equipment. The subsystem participates in incident response by deploying maintenance and construction resources to an incident scene, in coordination with other center subsystems. The subsystem manages equipment at the roadside, including	

Subsystem and Terminator Descriptions		
Subsystem/ Terminator	**Updated Description**	**CR #**
	environmental sensors and automated systems that monitor and mitigate adverse road and surface weather conditions. The subsystem manages the repair and maintenance of both non-ITS and ITS equipment including the traffic controllers, detectors, dynamic message signs, signals, and other equipment associated with the roadway infrastructure. Additional interfaces to weather information providers (the weather service and surface transportation weather service providers) provide current and forecast weather information that can be fused with other data sources and used to support advanced decision support systems that increase the efficiency and effectiveness of maintenance and construction operations. The subsystem remotely monitors and manages ITS capabilities in work zones, gathering, storing, and disseminating work zone information to other systems. It manages traffic in the vicinity of the work zone and advises drivers of work zone status (either directly at the roadside or through an interface with the Information Service Provider or Traffic Management subsystems). It schedules and manages the location and usage of maintenance assets (such as portable dynamic message signs). Construction and maintenance activities are tracked and coordinated with other systems, improving the quality and accuracy of information available regarding closures and other roadway construction and maintenance activities.	
Maintenance and Construction Vehicle (MCVS)	This subsystem resides in a maintenance, construction, or other specialized service vehicle or equipment and provides the sensory, processing, storage, and communications functions necessary to support highway maintenance and construction. All types of maintenance and construction vehicles are covered, including heavy equipment and supervisory vehicles. The subsystem provides two-way communications between drivers/operators and dispatchers and maintains and communicates current location and status information. A wide range of operational status is monitored, measured, and made available, depending on the specific type of vehicle or equipment. For example, for a snow plow, the information would include whether the plow is up or down and material usage information. The subsystem may also contain capabilities to monitor vehicle systems to support maintenance of the vehicle itself and other sensors that monitor environmental conditions including the road condition and surface weather information. This subsystem can represent a diverse set of mobile environmental sensing platforms, including wheeled vehicles and any other vehicle that collects and reports environmental information.	CR6320

Subsystem and Terminator Descriptions		
Subsystem/ Terminator	**Updated Description**	**CR #**
Map Update Provider	This terminator represents a provider of map databases used to support ITS services. It supports the provision of the databases that are used by travelers (e.g., navigable maps used for route guidance and display maps used at traveler information points) as well as those that are used by system operators (e.g., map data used by Traffic Operators to monitor and manage the road network, map data used by Fleet Managers to manage a vehicle fleet). This terminator may represent a third-party provider or an internal organization that produces map data for agency use. Products may include simple display maps, map data sets that define road network topology, or full geographic information system databases that are used to support ITS.	CR6321
Other CVAS	This terminator is intended to provide a source and destination for ITS data flows between peer (e.g., inter-regional) commercial vehicle administration functions. It enables commercial vehicle administration activities to be coordinated across different jurisdictional areas. In the Physical Architecture, this terminator is a reciprocal Commercial Vehicle Administration Subsystem (CVAS). This terminator encompasses all functions associated with commercial vehicle safety, registration, and operating authority for non-U.S. based commercial motor vehicle carriers. The agencies represented herein may include Federal, state, provincial, and local regulatory entities outside the U.S.	
Other Vehicle (OV)	This terminator represents another ITS vehicle system or subsystem and provides a source and destination for ITS information transfers between peer vehicle systems to support vehicle-to-vehicle communication and coordination. These features are associated with advanced vehicle safety systems and services that require communications between vehicles.	CR6320
Parking Management (PMS)	The Parking Management Subsystem provides electronic monitoring and management of parking facilities. It supports a Field-Vehicle Communications link to the Vehicle Subsystem that allows electronic collection of parking fees and monitors and controls parking meters that support conventional parking fee collection. It also includes the instrumentation, signs, and other infrastructure that monitors parking lot usage and provides local information about parking availability and other general parking information. This portion of the subsystem functionality must be located in the parking facility where it can monitor, classify, and share information with customers and their vehicles. The subsystem also interfaces with the financial infrastructure and broadly disseminates parking information to other operational centers in the region. Note that the latter functionality may be located in	CR6319 CR6322

Subsystem and Terminator Descriptions		
Subsystem/ Terminator	**Updated Description**	**CR #**
	a back office, remote from the parking facility.	
Potential Obstacles	Any object that possesses the potential of being sensed and struck and thus also possesses physical attributes. Potential Obstacles include roadside obstructions, other vehicles, pedestrians, infrastructure elements or any other element which is in a potential path of the vehicle. This terminator represents the physical obstacles which possess properties which enable detection using sensory functions included as part of the ITS architecture. These physical attributes are represented as a data input to the system.	CR6320
Roadway (RS)	This subsystem includes the equipment distributed on and along the roadway that monitors and controls traffic and monitors and manages the roadway itself. Equipment includes traffic detectors, environmental sensors, traffic signals, highway advisory radios, dynamic message signs, CCTV cameras and video image processing systems, grade crossing warning systems, and freeway ramp metering systems. HOV lane management, reversible lane management functions, and barrier systems that control access to transportation infrastructure such as roadways, bridges and tunnels are also supported. This subsystem also provides the capability for environmental monitoring including sensors that measure road conditions, surface weather, and vehicle emissions. In adverse conditions, automated systems can be used to apply anti-icing materials, disperse fog, etc. Work zone systems including work zone surveillance, traffic control, driver warning, and work crew safety systems are also included. To enhance security, safeguard systems such as blast shields, exhaust systems and other automated and remotely controlled systems to protect transportation infrastructure is also provided. In advanced implementations, this subsystem supports automated vehicle safety systems by safely controlling access to and egress from an Automated Highway System through monitoring of, and communications with, AHS vehicles. Intersection collision avoidance functions are provided by determining the probability of a collision in the intersection and sending appropriate warnings and/or control actions to the approaching vehicles.	
Roadway Environment	This terminator represents the physical condition and geometry of the road surface and the conditions surrounding the roadway. The geometry of the roadway and the road surface characteristics must be sensed and interpreted to support automated vehicle control services. Surrounding conditions may include fog, ice, snow, rain, wind, etc. which will influence the way in which a vehicle can be safely operated on	CR6320

Subsystem and Terminator Descriptions		
Subsystem/ Terminator	**Updated Description**	**CR #**
	the roadway. The condition of the roadway must be monitored by the architecture to enable corrective action and information dissemination regarding roadway conditions which may adversely affect travel. This physical interface carries these physical condition and geometry attributes which must be sensed, interpreted, and processed by functions internal to the system to achieve ITS User Service functionality.	
Toll Administration (TAS)	The Toll Administration Subsystem provides general payment administration capabilities and supports the electronic transfer of authenticated funds from the customer to the transportation system operator. This subsystem supports traveler enrollment and collection of both pre-payment and post-payment transportation fees in coordination with the existing, and evolving financial infrastructure supporting electronic payment transactions. The system may establish and administer escrow accounts depending on the clearinghouse scheme and the type of payments involved. This subsystem posts a transaction to the customer account and generates a bill (for post-payment accounts), debits an escrow account, or interfaces to the financial infrastructure to debit a customer designated account. It supports communications with the Toll Collection Subsystem to support fee collection operations. The subsystem also sets and administers the pricing structures and includes the capability to implement road pricing policies in coordination with the Traffic Management Subsystem. The electronic financial transactions in which this subsystem is an intermediary between the customer and the financial infrastructure shall be cryptographically protected and authenticated to preserve privacy and ensure authenticity and auditability.	
Toll Collection (TCS)	The Toll Collection Subsystem provides the capability for vehicle operators to pay tolls without stopping their vehicles using locally determined pricing structures and includes the capability to implement various variable road pricing policies. Each transaction is accompanied by feedback to the customer indicating the general status of the customer account. A record of the transactions is provided to the Toll Administration Subsystem for reconciliation and so that the customer can periodically receive a detailed record of the transactions.	
Traffic Management (TMS)	The Traffic Management Subsystem monitors and controls traffic and the road network. It represents centers that manage a broad range of transportation facilities including freeway systems, rural and suburban highway systems, and urban and suburban traffic control systems. This subsystem communicates with the Roadway	CR6318

Subsystem and Terminator Descriptions		
Subsystem/ Terminator	**Updated Description**	**CR #**
	Subsystem to monitor and manage traffic flow and monitor the condition of the roadway, surrounding environmental conditions, and field equipment status. This subsystem coordinates with the Maintenance and Construction Management Subsystem to maintain the road network and coordinate and adapt to maintenance activities, closures, and detours. Incidents are detected, verified, and incident information is provided to allied agencies, drivers (through Roadway Subsystem highway advisory radio and dynamic message signs), and information service providers. This subsystem also manages traffic and transportation resources to support allied agencies in responding to, and recovering from, incidents ranging from minor traffic incidents through major disasters. When required, special traffic management strategies are implemented to support evacuation and reentry. The Traffic Management Subsystem supports HOV lane management and coordination, road pricing, and other demand management policies that can alleviate congestion and influence mode selection. It also manages reversible lane facilities and barrier and safeguard systems that control access to transportation infrastructure. The subsystem communicates with other Traffic Management Subsystems to coordinate traffic information and control strategies in neighboring jurisdictions. It also coordinates with rail operations to support safer and more efficient highway traffic management at highway-rail intersections. Finally, the Traffic Management Subsystem provides the capabilities to exercise control over those devices utilized for automated highway system (AHS) traffic and vehicle control.	
Transit Vehicle (TVS)	This subsystem resides in a transit vehicle and provides the sensory, processing, storage, and communications functions necessary to support safe and efficient movement of passengers. The types of transit vehicles containing this subsystem include buses, paratransit vehicles, light rail vehicles, other vehicles designed to carry passengers, and supervisory vehicles. The subsystem collects accurate ridership levels and supports electronic fare collection. The subsystem supports a traffic signal prioritization function that communicates with the roadside subsystem to improve on-schedule performance. Automated vehicle location functions enhance the information available to the Transit Management Subsystem enabling more efficient operations. On-board sensors support transit vehicle maintenance. The subsystem supports on-board security and safety monitoring. This monitoring includes transit user or vehicle operator activated alarms (silent or audible), as well as surveillance and sensor equipment. The surveillance equipment includes video	CR6320

Subsystem and Terminator Descriptions		
Subsystem/ Terminator	**Updated Description**	**CR #**
	(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). In addition, the subsystem supports vehicle operator authentication prior to operation of the vehicle and remote vehicle disabling. The subsystem also furnishes travelers with real-time travel information, continuously updated schedules, transfer options, routes, and fares.	
Traveler Card	This terminator represents the entity that enables the actual transfer of electronic information from the user of a service (i.e., a traveler) to the provider of the service. This may include the transfer of funds through means of an electronic payment instrument. The device, like a smart card, may also hold and update the traveler's information such as personal profiles or trip histories.	
Vehicle Subsystem	This subsystem provides the sensory, processing, storage, and communications functions necessary to support efficient, safe, and convenient travel. These functions reside in general vehicles including personal automobiles, commercial vehicles, emergency vehicles, transit vehicles, or other vehicle types. Information services provide the driver with current travel conditions and the availability of services along the route and at the destination. Both one-way and two-way communications options support a spectrum of information services from low-cost broadcast services to advanced, pay for use personalized information services. Route guidance capabilities assist in formulation of an optimal route and step by step guidance along the travel route. Advanced sensors, processors, enhanced driver interfaces, and actuators complement the driver information services so that, in addition to making informed mode and route selections, the driver travels these routes in a safer and more consistent manner. Initial collision avoidance functions provide “vigilant co-pilot” driver warning capabilities. More advanced functions assume limited control of the vehicle to maintain safe headway. Ultimately, this subsystem supports completely automated vehicle operation through advanced communications with other vehicles in the vicinity and in coordination with supporting infrastructure subsystems. Pre-crash safety systems are deployed and emergency notification messages are issued when unavoidable collisions do occur.	CR6320

Table 6 presents the definitions for equipment packages. All definitions are from National ITS Architecture Version 6.1 (Reference [6]). Italics indicate that the equipment package currently falls outside the scope of Core CVISN but is part of systems that support commercial vehicle operations; if an italicized equipment package name is also underlined, it supports Expanded CVISN capabilities.

Table 6. Equipment Package Descriptions

Equipment Package Descriptions		
SUBSYSTEM Equipment Package	**Updated Description**	**CR #**
CVAS		
Credentials and Taxes Administration	This equipment package issues credentials, collects fees and taxes, and supports enforcement of credential requirements. It manages driver licensing. It communicates with the Fleet and Freight Management Subsystems associated with the motor carriers to process credentials applications and collect fuel taxes, weight/distance taxes, and other taxes and fees associated with commercial vehicle operations. The subsystem also receives applications for, and issues special Oversize/Overweight and HAZMAT permits in coordination with other cognizant authorities. This equipment package communicates with similar packages in other jurisdictions to exchange credentials database information. This equipment package also exchanges hazmat route restrictions information, and provides a clearinghouse for this information that can be shared with Map Update Providers, Fleet and Freight Management subsystems and Information Service Providers.	
CV Data Collection	This equipment package collects and stores commercial vehicle information that is collected in the course of Commercial Vehicle Administration Subsystem 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.	
CV Information Exchange	This equipment package supports the exchange of safety and credentials data among jurisdiction[s]. The package also supports the exchange of safety and credentials 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.	
CV Safety and Security Administration	This equipment package 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	

Equipment Package Descriptions		
SUBSYSTEM Equipment Package	**Updated Description**	**CR #**
	enforcement agencies. 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.	
International CV Administration	This equipment package generates and processes the entry documentation necessary to obtain release of vehicle, cargo, and driver across an international border, report the results of the crossing event, and handle duty fee processing. It interfaces with the systems used by customs and border protection, immigration, carriers, and service providers (e.g., brokers) to generate, process, and store entry documentation.	CR6318
CVCS		
Citation and Accident Electronic Recording	The equipment package documents accidents, citations, and violations identified during roadside safety inspections and forwards the information to the Commercial Vehicle Administration Subsystem for processing. It collects data from the vehicle to help characterize the circumstances surrounding the accident.	
International Border Crossing	This equipment package checks compliance with import/export and immigration regulations to manage release of commercial vehicle, cargo, and driver across an international border. It includes interfaces to the equipment at international border crossings operated by government agencies such as Customs and Border Protection.	CR6318
Roadside Electronic Screening	This equipment package provides two-way communication with approaching properly equipped commercial vehicles at mainline speeds, reading tags for automated vehicle identification and credential checking. This equipment package processes the data from the commercial vehicles along with accessed database information to determine whether a pull-in message is needed or to generate random pull-in messages with provisions for facility operators and enforcement officials to have manual override capabilities.	
Roadside HAZMAT Detection	This equipment package detects and identifies commercial vehicles carrying security sensitive hazardous materials. It assesses the likelihood of the presence of security sensitive HAZMAT materials based on remote sensed data as well as other physical information acquired about the commercial vehicle. It then determines if any detected HAZMAT is authorized. If unauthorized HAZMAT material is detected, a pull-in message is generated. The equipment package may also issue a message to the Emergency Management (Police Dispatch) function that includes: location of the incident, current location of the commercial vehicle, timestamp, Vehicle ID, Carrier	CR6322

Equipment Package Descriptions		
SUBSYSTEM Equipment Package	**Updated Description**	**CR #**
	ID, Driver ID, CV Credentials information, HAZMAT material or category detected, and cargo manifest (if known).	
Roadside Safety and Security Inspection	This equipment package supports the roadside safety inspection process. It reads on-board safety data at mainline speeds to rapidly check the vehicle and driver and accesses historical safety data after identifying vehicles at mainline speeds or while stopped at the roadside. The capabilities to process safety data and issue pull-in messages or provide warnings to the driver, carrier, and enforcement agencies are also provided. It includes hand held or automatic devices to rapidly inspect the vehicle and driver. Results of screening and summary safety inspection data are stored and maintained. Since a vehicle may cross jurisdictional boundaries during a trip, this equipment package supports the concept of a last clearance event record carried on the vehicle tag. The last clearance event record reflects the results of the roadside verification action. For example, if the vehicle is pulled over in State A and undergoes credential, weight, and safety checks, the results of the clearance process are written to the vehicle's tag. If the vehicle continues the trip and passes a roadside station in State B, the State B station has access to the results of the previous pull-in because it can read the last clearance event record written by the State A roadside station. This equipment package associates high-risk cargo with the container/chassis, manifest, carrier, vehicle and driver transporting it.	CR6322
Roadside WIM	This equipment package measures commercial vehicle weight at high speeds. It includes both portable and permanent installations and can be used to augment electronic credentials checking or it can be a stand alone package with display.	
CVS		
On-board Cargo Monitoring	This on-board equipment package 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, this equipment package may include sensors that measure temperature, pressure, load leveling, acceleration, and other attributes of the cargo.	
On-board CV Electronic Data	This on-board equipment package 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	

Equipment Package Descriptions		
SUBSYSTEM Equipment Package	**Updated Description**	**CR #**
	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 by this equipment package.	
On-board CV Safety and Security	This on-board equipment package collects and processes vehicle and driver safety and security information and provides safety and security information to the Fleet and Freight Management Subsystem. This equipment package also supplies this information to the roadside facilities both at mainline speeds and while stopped for inspections. The capability to alert the commercial vehicle driver whenever there is a critical safety or security problem or potential emergency is also provided. The package also supports on-board driver safety log maintenance and checking.	
On-board Driver Authentication	This on-board equipment package monitors the identity of the commercial vehicle driver and compares it with the planned drivers for the commercial vehicle. Any change in driver is sent to the Fleet and Freight Management Subsystem. Notification of any unexpected drivers will also be sent to the Fleet and Freight Management Subsystem which, in turn, may send a disable vehicle command back to this equipment package to cause the vehicle to stop. On receipt of a disable vehicle message from the Fleet and Freight Management Subsystem or on detection of an unauthorized driver, the equipment package will safety [sic] disable the CV.	
On-board Trip Monitoring	This equipment package 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 Subsystem of any deviations.	
FMS		
Commercial Vehicle and Freight Security	This equipment package provides for the security of the commercial vehicle and the freight that it carries by detecting breaches such as seals or locks being broken into by unauthorized personnel and/or any other unauthorized tampering. In addition, this equipment package monitors the commercial vehicle driver and compares it with the planned driver for the vehicle. In a similar manner, the driver and vehicle that have been assigned to move freight are monitored and compared with the planned assignment for that freight. In all cases, any deviations to the planned assignments and any breach or tamper events are reported to the Emergency Management Subsystem.	

Equipment Package Descriptions		
SUBSYSTEM Equipment Package	**Updated Description**	**CR #**
Fleet Administration	This equipment package provides vehicle tracking, dispatch, and reporting capabilities to fleet management center personnel. It gathers current road conditions and traffic 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, this equipment package monitors commercial vehicle location, compares it against the known route and notifies the Emergency Management Subsystem and Fleet-Freight Manager of any deviations, including HAZMAT route restriction violations. This equipment package 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.	
Fleet Credentials and Taxes Management and Reporting	This equipment package provides the capability to purchase credentials, file taxes and trip reports electronically, 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.	
Fleet HAZMAT Management	This equipment package manages hazardous materials shipments. In the event of an incident, it notifies the Emergency Management Subsystem, providing information on the nature of the cargo and the vehicle equipment.	
Fleet Maintenance Management	This equipment package tracks and monitors diagnostic results, vehicle mileage, inspection records, and repair and service records collected from a commercial vehicle fleet equipped with on-board monitoring equipment. The data is used to develop preventative maintenance and repair schedules and repair and service records are maintained.	
Freight Administration and Management	This equipment package manages the movement of freight from source to destination via links to the freight equipment, intermodal freight shippers, and depots. It interfaces to intermodal freight shippers to setup and schedule transportation and coordinates with intermodal freight depots 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 equipment package monitors the status of the freight and freight equipment (container, trailer, or chassis) and monitors freight location and compares it against the planned route.	CR6318
Manage CV Driver Identification	This equipment package collects and stores driver identification records including driver issued PINS and/or individual driver biometric measurements. The equipment package can also manage the storage of driver PINs, data from a driver identification	CR6322

Equipment Package Descriptions		
SUBSYSTEM Equipment Package	**Updated Description**	**CR #**
	card, and/or biometric measurements for authorized drivers on individual commercial vehicles. Based on information reported by the commercial vehicle, the equipment package will determine if the driver is authorized, and notify the Commercial Vehicle Manager when an unauthorized driver is detected. The Commercial Vehicle Manager may override the disable vehicle action. When an unauthorized driver is detected and the system is not overridden, then the equipment package will issue a message to the commercial vehicle to safely disable the vehicle. If an unauthorized driver is detected, then the equipment package will send to the Emergency Management Subsystem an alert that includes: incident location, current location of the CV, Vehicle ID, Carrier ID, Driver ID, CV Credentials information, and cargo manifest (if known).	
VS		
Basic Vehicle Reception	This equipment package provides the capability for drivers to receive basic transportation information including traffic and road conditions, incident information, maintenance and construction information, event information, transit information, parking information, weather information, and broadcast alerts.	CR6320
Driver Safety Monitoring System	This equipment package monitors the driver's condition and warns the driver of potential dangers. This equipment package includes driver sensors to assess the suitability of the driver (e.g., fitness and alertness) to assume manual control of the vehicle.	CR6320
Driver Visibility Improvement System	The equipment package augments the driver's ability to see objects in the vehicle path in conditions where visibility is poor (e.g., bad weather, night driving, etc.). These capabilities are provided using on-board sensors (e.g., an infrared sensor system) to create images that are displayed to the driver (e.g., using a heads up display).	CR6320
Interactive Vehicle Reception	This equipment package 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.	CR6320

Equipment Package Descriptions		
SUBSYSTEM Equipment Package	**Updated Description**	**CR #**
Vehicle Automated Operations	This equipment package provides the capability for "hands-off" and "feet off" operation of an equipped vehicle on the automated portion of the highway system including the longitudinal control, lateral control for lane change/merge and roadway departure, regulating the vehicle speed and steering control, and sensing impending hazards and responding appropriately. These capabilities are provided by systems on board the vehicle to regulate longitudinal and lateral control maneuvers, including acceleration, braking, and steering functions. The capability to control access to the automated highway system is provided through an automated check-in procedure in which the vehicle and driver are checked for their fitness.	CR6320
Vehicle Autonomous Route Guidance	This equipment package provides route planning and turn by turn route guidance to a driver using an on-board digital map. The equipment package includes autonomous systems that are not configured to receive or process real-time information. In advanced implementations, this equipment package receives real-time traffic and road conditions information from the infrastructure and factors this real-time information into its route selection and guidance algorithms.	CR6320
Vehicle Environmental Probe Support	This equipment package includes the vehicle sensors and communications systems that sense and send road conditions and surface weather information as the vehicle travels. The same vehicle equipment that improves stability and provides driver information in adverse conditions is a potential source for this information.	CR6320
Vehicle Intersection Control	This equipment package detects potentially hazardous situations in an intersection and takes control of the vehicle to avoid a potential collision. This equipment package includes the on-board sensors that detect potential hazards, the actuator systems that provide automated control of the vehicle, and equipment that communicates with the infrastructure to identify intersection safety issues identified by field equipment at the intersection.	CR6320
Vehicle Intersection Safety Warning	This equipment package detects and notifies the driver of potentially hazardous situations in an intersection. The equipment package monitors intersection status and vehicle speed on the approach to the intersection and warns the driver if necessary. It shares vehicle status with field equipment at the intersection and uses intersection status provided by this field equipment to warn the driver of impending violations or potential conflicts with other vehicles approaching the intersection. This equipment package includes the on-board sensors that detect potential hazards, equipment that communicates with the infrastructure to identify safety issues identified by field equipment at the intersection, and equipment that provides visual and/or audible	CR6319 CR6320

Equipment Package Descriptions		
SUBSYSTEM Equipment Package	**Updated Description**	**CR #**
	warnings to the driver.	
Vehicle Lateral Control	This equipment package provides lateral control of a vehicle to allow "hands off" driving, automating the steering control function. It includes on-board systems that detect lanes and obstacles or vehicles to the sides of the vehicle. This sensor information is processed on board the vehicle, and appropriate steering control actions are maintained using steering actuators.	CR6320
Vehicle Lateral Warning System	This equipment package monitors areas to the sides of a vehicle and provides warnings to a driver so the driver can take action to recover and maintain safe control of the vehicle. It includes on-board sensors that detect lanes and obstacles or vehicles to the sides of the vehicle and the driver information system that provides the warning.	CR6320
Vehicle Location Determination	This equipment package receives current location of the vehicle from the Location Data Source terminator and provides this information to other equipment packages that use the location information to provide various ITS services.	CR6320
Vehicle Longitudinal Control	This equipment package provides longitudinal control of a vehicle to allow "feet off" driving, automating the function of speed control, acceleration, and braking to maintain safe following distances. It includes on-board systems that detect obstacles or vehicles in the longitudinal path of the vehicle. This sensor information is processed on board the vehicle, and appropriate control actions (acceleration, braking, or maintaining speed) are initiated using accelerator and/or brake actuators.	CR6320
Vehicle Longitudinal Warning System	This equipment package monitors areas in front of and behind the vehicle and provides warnings to the driver so the driver can take action to recover and maintain safe control of the vehicle. It includes on-board sensors that detect objects in front of or behind the vehicle and the driver information system that provides the warning.	CR6320
Vehicle Location Determination	This equipment package receives current location of the vehicle from the Location Data Source terminator and provides this information to other equipment packages that use the location information to provide various ITS services.	CR6319 CR6322
Vehicle Mayday I/F	This equipment package provides the capability for drivers or collision detection sensors to report an emergency and summon assistance. This equipment package includes the on-board collision detection sensors, a mechanism for the driver to summon assistance, and two-way communications with a service provider.	

Equipment Package Descriptions		
SUBSYSTEM Equipment Package	**Updated Description**	**CR #**
Vehicle On-board Diagnostics System	This equipment package monitors engine-related components, including the emissions control system, to make sure they are operating properly. Detected problems are reported to the driver and additional diagnostics data is stored for the service technician. Vehicle diagnostics data is made available via short range communications to support vehicle performance monitoring, service, and repair.	CR6320
Vehicle Pre-Crash Safety System	This equipment package monitors the vehicle's local environment, determines collision probability, and deploys a pre-crash safety system when a crash is imminent. It includes on-board communications equipment and sensors to determine the proximity and closing rates of neighboring vehicles or other roadway obstacles. These detection systems are supplemented by additional sensors that monitor existing weather and roadway conditions and roadway geometry. The equipment package assimilates this information and determines the probability of a collision with the other vehicle or obstacle. If the collision probability is high, it deploys a pre-crash safety system either to avoid the accident or to reduce the accident severity.	CR6320
Vehicle Safety Monitoring System	This equipment package monitors critical components of the vehicle and warns the driver of potential dangers. These capabilities are provided by on-board sensors to monitor the vehicle condition and performance, including steering, braking, acceleration, emissions, fuel economy, engine performance, etc. Problems with any of these systems are identified and reported to the driver. Warnings are provided in the event of a serious condition (e.g., likely failure or damage).	CR6320
Vehicle Secure Area Access System	This equipment package provides access to secure areas such as shipping yards, warehouses, airports, transit-only ramps, parking gates and other areas. It accepts inputs from the vehicle driver that include the necessary identity information and uses this information to generate the request to activate a barrier to gain access to the area.	CR6320
Vehicle Short Range Traveler Information Reception	This equipment package receives advisories, vehicle signage data, and other driver information via short range communications and presents this information to the driver using in-vehicle equipment. Information presented may include fixed sign information, traffic control device states (e.g., traffic signal states), advisory and detour information, warnings of adverse road and weather conditions, travel times, and other driver information.	CR6320

Equipment Package Descriptions		
SUBSYSTEM Equipment Package	**Updated Description**	**CR #**
Vehicle Toll/Parking Interface	This equipment package includes the on-board systems that pay for tolls and parking electronically. It includes in-vehicle equipment that communicates with the toll/parking plaza (e.g., a tag) and an optional interface to a traveler card to allow use of a common payment medium for all transportation services.	
Vehicle Traffic Probe Support	This equipment package includes capabilities for the probe vehicle to identify its location, measure traffic conditions such as link travel time and speed, and transmit these data to a center or roadside equipment.	CR6320
Vehicle Trip Planning and Route Guidance	This equipment package 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 Information Service Provider based on preferences and constraints supplied by the driver and provided to the driver for confirmation. Reservations and advanced payment may also be processed by this equipment package to confirm the trip plan. Coordination with the Information Service Provider 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.	CR6320
Vehicle Warning System	This equipment package receives location information from nearby vehicles and uses the received information to determine if there is a possibility of collision and warn the driver. This equipment package also provides information to surrounding vehicles about its own location, speed, and other information to allow other similarly equipped vehicles to warn their drivers if necessary. The same equipment also receives alerts from responding emergency vehicles in the vicinity so the driver can be warned of the approaching emergency vehicle, increasing the safety of the driver and the emergency responder. It includes on-board equipment (OBE) that sends and receives the messages and determines if there is a need to warn the driver, and the driver information system that provides the warnings.	CR6320

3. CHANGE REQUESTS

This section summarizes the changes incorporated into the CVISN Architecture since it was aligned with the National ITS and IBC Architectures as documented in References [1], [2], [3], and [4] prior to the release of Versions 6.0 and 6.1 of the National ITS Architecture, Reference [6].

CR 4966 – Add new architecture flow CVS-to-CVCS to report "commercial vehicle disable status"

CR 5804 – Update the CVISN Architecture "sausage" diagram to conform to National ITS Architecture Versions 6.0 and 6.1

CR 6318 –Match Border Information Flow Architecture changes in National ITS Architecture version 6.0 and 6.1

CR 6319 – Update to reflect National ITS Architecture Version 6.0 and 6.1 VII changes

CR 6320 – Expand CVISN to include Vehicle Subsystem and Driver Terminator interfaces

CR 6321 – Update to reflect National ITS Architecture Version 6.0 and 6.1 Clarus and ICMS changes

CR 6322 – Update to reflect miscellaneous National ITS Architecture Version 6.0 and 6.1 changes and to simplify the CVISN Architecture document

CR 6333 – Update to reflect National ITS Architecture Version 6.1 UEFM – Universal Electronic Freight Management changes

The changes indicated in the following CRs will be incorporated in a future version of the National ITS Architecture. This document already reflects these changes as part of the CVISN Architecture.

CR 6410 – Clarify how architecture flow *credentials information* is shared.

CR 6411 – Clarify flows related to border clearance activities.

4. REFERENCES

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[3] JHU/APL, *Commercial Vehicle Information Systems and Networks (CVISN) Architecture*, SSD-POR-02-7364 V1.0, May 2002. (Delivered via SSD-PL-02-0307, 22 August 2002.)

[4] JHU/APL, *Commercial Vehicle Information Systems and Networks (CVISN) Architecture*, SSD-POR-02-7364 V2.0, March 2004. (Delivered via SSD-PL-04-0133, 1 April 2004.)

[5] JHU/APL, *Commercial Vehicle Information Systems and Networks (CVISN) Architecture*, SSD-POR-02-7364 V3.0, December 2006. (Delivered via NSTD-L-21715, 19 December 2006.)

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[7] JHU/APL, CVISN Operational and Architectural Compatibility Handbook (COACH), Part 1 – Operational Concept and Top-Level Design Checklists, NSTD-08-487, V4.0, November 2008. (Delivered via NSTD-L-23719, 20 November 2008.) The latest version will be available on the FMCSA CVISN Web site http://www.fmcsa.dot.gov/facts-research/cvisn.

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[14] JHU/APL, *Expanded CVISN Smart Roadside Capability Report: Roadside Access to Data*, SSD-PL-05-0198, June 2005, http://www.fmcsa.dot.gov/facts-research/cvisn.

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[16] JHU/APL, *Expanded CVISN Expanded E-Credentialing Capability Report: Better E-Credentialing*, SSD-PL-05-0200, June 2005, http://www.fmcsa.dot.gov/facts-research/cvisn.

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APPENDIX A. – EXPANDED CVISN CAPABILITIES

The list of Expanded CVISN Capabilities includes these items. Please see References [9] thru [17] for information about how the list was generated and for the reports on selected capabilities. Those that are in gray text (instead of black) are not at a level that would affect the National ITS Architecture.

Driver Information Sharing

D1. Establish, maintain and provide controlled access to driver snapshots/Use and maintain driver snapshots for all processes.

D2. Improve access to driver information for enforcement and carrier personnel to target driver safety risk.

D3. Provide roadside tools to evaluate compliance with hours-of-service regulations.

D4. Improve identity checks in all driver-licensing processes.

D5. Link driver performance data to related carrier ID to identify high-risk carriers.

D6. Determine security rating for drivers.

D7. Provide on-line tools to help carriers assess potential drivers and monitor current drivers' performance.

D8. Ensure that systems control access to driver records.

D9. Allow the driver to review, challenge and correct information in their driving record.

D10. Expand the use of standards for commercial drivers' licenses (CDLs) and information systems that store driver data; include standards for identification security.

D11. Improve the standardization of citation data collection and information sharing among enforcement agencies.

Enhanced Safety Information Sharing

S1. Establish data timeliness, data accuracy and integrity measures.

S2. Regularly check data used in CVISN processes for timeliness, accuracy and integrity; purge stale data and repair errors.

S3. Expand core safety systems to include standard information storage and exchange for intrastate and foreign carriers, in addition to interstate carriers.

S4. Establish or expand "data stores" for cargo, carrier, vehicle and driver credential, safety and enforcement data.

S5. Provide on-line tools to enable appropriate users to provide timely information about corrections of deficiencies detected during inspections.

S6. Improve the carrier's ability to review safety data associated with its record. Consider proactively delivering safety data to carrier.

S7. Provide on-line tools for law enforcement to submit crash and citation reports.

S8. Enable jurisdictions to maintain up-to-the-minute inspection history data.

Smart Roadside

R1. Expand access to data collected by on-board systems to improve roadside operations.

R2. Provide integrated and improved access for roadside personnel to data stored in core infrastructure systems [e.g., Safety and Fitness Electronic Records (SAFER), Motor Carrier Management Information System (MCMIS), CDL data systems].

R3. Provide carriers with streamlined and timely access to citation, crash, and inspection information so they are better informed about safety problems.

R4. Associate high-risk cargo with the container, manifest, chassis, vehicle/transponder, carrier(s), vehicle and driver transporting it.

R5. Expand the use of standard electronic security devices (ESDs) to improve container and trailer security and reduce theft.

R6. Monitor status of the ESDs throughout the trip by collecting "event data" at toll booths, ports of entry, inspection/weigh stations and freight yard entries/exits.

R7. Expand the use of technologies and processes to verify authorized drivers and personnel are able to access the vehicle, trailer and container.

R8. Provide access to the event data and related information to authorized private and public sector users – based on legitimate needs for information to improve productivity, streamline operations and improve security.

R9. Expand the use of mobile data entry devices [e.g., laptop, personal data assistant (PDA), cell phone] and applications to improve data quality and streamline data collection.

R10. Expand the use and capabilities of virtual/remote sites to increase the effectiveness of enforcement.

R11. Expand the use of technology to generate real-time safety and security alerts.

Expanded Electronic Credentialing

C1. Reduce complexity and redundancy for users by offering access to multiple credentials from a single source.

C2. Increase the number of e-credentials that are available [e.g., oversize/overweight (OS/OW) permitting, Hazardous Materials (HazMat)].

C3. Offer a variety of standard e-payment options.

C4. Improve the process for enrolling in multi-jurisdiction programs (e.g., e-screening programs, e-toll) through provision of links.

C5. Provide for automated queries to cross-check supporting requirements across agencies, states and federal systems through use of unique carrier, vehicle, driver and load identifiers.

C6. Legacy credentialing systems update Commercial Vehicle Information Exchange Window (CVIEW) with changes in credentials data for real-time access.

C7. Enhance interfaces and systems for information sharing to provide improved access to more current and accurate credentials information for authorized stakeholders.

C8. Designate one authoritative source for each credential-related data element and provide date/time stamp; manage changes; auditable.

C9. Use secure electronic identification, notification, documentation and screening for vehicles, carriers, drivers and cargo.

C10. Expand the set of standard data elements for information exchange related to credentials.

APPENDIX B. – RECOMMENDED PRIMARY IDENTIFIERS

Entity	Identifier Name	Identifier Segments	Number of Characters
Motor Carrier	Primary Carrier ID for ***interstate*** carrier: e.g., 12345 A001 (note that '12345' must be the carrier's USDOT # ; the terminal ID 'A001' is optional)	Carrier-Specific Identifier (alphanumeric); must be USDOT number + Carrier Terminal ID designated by carrier (alphanumeric) (optional) + CVO Company Type	12 (max) 4 (max) TBD
	Primary Carrier ID for ***intrastate*** carrier: e.g., US CA 123A45689 1234 (note that the terminal ID '1234' is optional)	Country Code (alpha); allowable codes from ISO 3166-1, country codes (English) + Jurisdiction (state or province) Code (alphanumeric); the allowable codes are defined in the SAFER Interface Control Document (Reference [8]) + Carrier-Specific Identifier; if carrier is intrastate and has a USDOT number, must be USDOT number; for state-specific IDs, the Carrier-Specific Identifier may include a prefix to clarify the agency/source of the identifier) + Carrier Terminal ID designated by carrier (alphanumeric) (optional) CVO Company Type	2 2 12 (max) 4 (max) TBD
	For all carriers: Federal Taxpayer Identification Number e.g., E 123456789 Note: Open issue regarding Mexican and Canadian carriers	Type (alphanumeric); S for Social Security Number, E for Employer Identification Number + Tax ID Number (alphanumeric)	1 9

Entity	Identifier Name	Identifier Segments	Number of Characters
Driver	Driver Unique ID e.g., US MD B99999999999A	Country code (alpha); allowable codes from ISO 3166-1, country codes (English) + Jurisdiction (state or province) code (alphanumeric); the allowable codes are defined in the SAFER Interface Control Document (Reference [8]) + Driver specific identifier (driver license number) assigned by jurisdiction (alphanumeric)	2 2 16 (max)
Vehicle	Vehicle Identification Number e.g., 1FDKE30F8SHB33184 **and**	VIN assigned by manufacturer (alphanumeric)	30 (max)
	Vehicle Plate ID e.g., US CA 12345664820M	Country code (alpha); allowable codes from ISO 3166-1, country codes (English) + Jurisdiction (state or province) code (alphanumeric); the allowable codes are defined in the SAFER Interface Control Document (Reference [8]) + License plate ID (alphanumeric)	2 2 12 (max)
Container	Container Unique ID e.g., SUDU3070079	Suggested as a candidate: Container marked on side (in accordance with ISO 6346) (alphanumeric)	11 (suggested)
Shipment	Shipment Unique ID e.g., 123456789776655443322	Shipper ID. DUNS number suggested as a candidate (alphanumeric) + Bill of Lading number assigned by the shipper identified above (numeric)	9 (suggested) 12 (max)

Entity	Identifier Name	Identifier Segments	Number of Characters
Transponder	Transponder ID e.g., 0 123456789 or 1 9999 232323	Transponder ID Definition Flag (0=current; 1=IEEE 1455-1999) + *If Transponder ID Definition Flag = current*, then the other segment is: Transponder Serial Number assigned by manufacturer *If Transponder ID Definition Flag = IEEE 1455-1999*, then the other segments are: Manufacturer Identifier + Transponder Serial Number assigned by manufacturer	1 (1 bit) 8 (32-bit hexadecimal value) 4 (16 bits hexadecimal value) 5 (20 bits hexadecimal value)

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