Commercial Vehicle Information Systems and Networks (CVISN) System Design Description

POR-97-6998 V3.0

April 2003

Prepared for:

Federal Motor Carrier Safety Administration

US Department of Transportation

Prepared by:

The Johns Hopkins University
Applied Physics Laboratory

Note

The Motor Carrier Safety Improvement Act was signed into law on December 9, 1999. This act established a new FMCSA (Federal Motor Carrier Safety Administration) within the US DOT (United States Department of Transportation), effective January 1, 2000. Prior to that, the motor carrier and highway safety program was administered under the Federal Highway Administration (FHWA). The mission of the FMCSA is to improve truck and commercial passenger carrier safety on our nation's highways through information technology, targeted enforcement, research and technology, outreach, and partnerships. The FMCSA manages the Intelligent Transportation Systems (ITS)/Commercial Vehicle Operations (CVO) Program, a voluntary effort involving public and private partnerships that uses information systems, innovative technologies, and business practice reengineering to improve safety, simplify government administrative systems, and provide savings to states and motor carriers. The FMCSA works closely with the FHWA's ITS JPO (Joint Program Office) to ensure the integration and interoperability of ITS/CVO systems with the national ITS program.

As part of the CVISN program, FMCSA defined an initial set of capabilities that could be deployed incrementally by a state and its motor carriers. The capabilities focus on electronically exchanging safety and credentialing information, electronically processing interstate registration and fuel tax credentials, and implementing roadside electronic screening at one fixed or mobile site. These capabilities were originally referred to as "CVISN Level 1" capabilities, but are now called "Core" CVISN capabilities.

This is Version 3 of a Baseline Issue

This document has completed internal and external reviews of previously published drafts and preliminary versions. All comments received to date have been incorporated or addressed.

Note: This document and other CVISN-related documentation are available for review and downloading by the ITS/CVO community from The Johns Hopkins University/Applied Physics Laboratory (JHU/APL) CVISN site on the World Wide Web. The URL for the CVISN site is: **http://www.jhuapl.edu/cvisn/**.

Review and comments to this document are welcome. Please send comments to:

Mr. Ronald Char
The Johns Hopkins University
Applied Physics Laboratory
11100 Johns Hopkins Road
Laurel, MD 20723-6099

Phone: 717-261-7037
Fax: 717-261-0635
E-Mail: ronald.char@jhuapl.edu

References to the change requests (CRs) listed below appear in the document so that the reader knows where each CR affected Version V3.0 of the document.

In January, 2002, APL transitioned to a new tool for Configuration Management. The change request numbering was reinitialized; hence CR numbers have wrapped around.

Change Summary V3.0:

Version V3.0 of the document incorporates revisions related to these change requests:

- CR 1084 – Update Generic State Design Template and CVISN System Design Stakeholder View
- CR 58 – Transponder ID
- CR 69 – IFTA tax scenario changes
- CR 72 – No EDI queries from APL developed CVIEW to SAFER; SAFER accepts EDI and RPC
- CR 82 – Align CVISN and National ITS Architecture flows
- CR 90 – Clarify Level 1 summary slide
- CR 95 – Update DSRC “sandwich” spec guidance
- CR 98 – Update the Interfaces Within the State diagram in the CVISN System Design Description
- CR 100 – IBC/CVISN/National ITS Architecture alignment
- CR 101 – Update documents regarding TS 284 not supported in Fed systems
- CR 103 – Align with National ITS Arch Maintenance & Construction Ops
- CR 358 – Update documentation reflecting V4 of Nat'l ITS Architecture
- CR 604 – Disapproved (EDI interface for IRP and IFTA CH)
- CR 607 – Remove WWW, EDI, DSRC interfaces diagram; improve CVIEW
- CR 681* – Changes to IFTA transactions in SAFER 4.2
- CR 682* – Changes to IRP transactions in SAFER 4.2
- CR 683* – Changes to E-Screening transactions in SAFER 4.2
- CR 684* – Changes to SAFER to State trans. for MCMIS and L&I in SAFER 4.2
- CR 685* – Changes to SAFER to State trans. for IFTA in SAFER 4.2
- CR 686* – Changes to SAFER to State trans. for IRP in SAFER 4.2
- CR 687* – Changes to SAFER to State trans. for E-Screening in SAFER 4.2
- CR 688* – Changes to EDI State-SAFER interface in SAFER 4.2
- CR 704 – Recommendations for Primary Identifiers White Paper
- CR 785* – Changes to SAFER to State trans. for Veh.Inspection in SAFER 4.2
- CR 861 – System Design Description document “clean-up”
- CR 877 – New MCMIS replaces MCMIS
- CR 895 – Query Central needs to be added to the list of CVISN Core Infrastructure systems.

* These CRs are lumped together and called “SAFER XML” within the document.

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CVISN System Design Description
1 - Introduction

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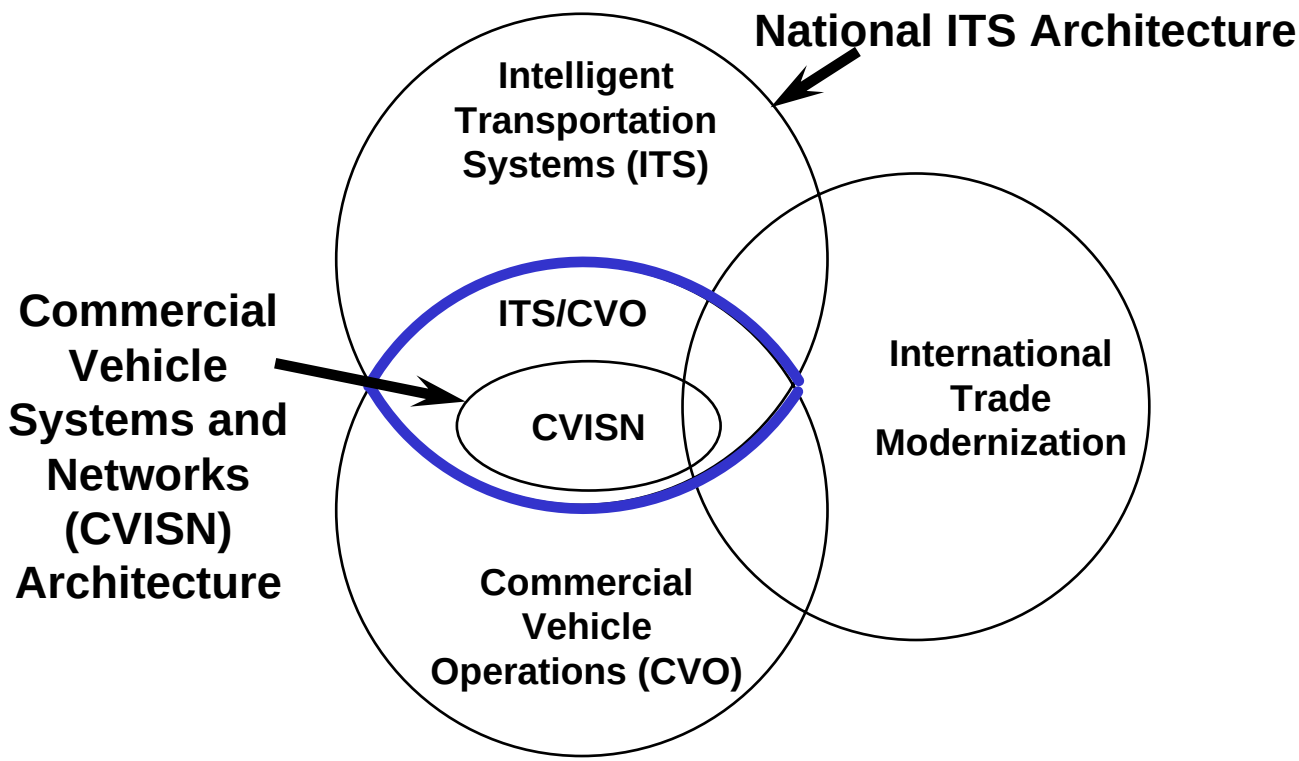
Introduction

- This CVISN System Design Description document provides additional detail beyond the CVISN Architecture by describing:
  - System requirements related to CVISN Level 1 (Section 2)
  - The generic CVISN design, with the components organized into key stakeholder groups (Section 3)
  - How the elements fit together (Section 4)
- The document is intended to be a fairly high-level and easy-to-read document. The primary audience is the state CVISN project team.
- The document should answer these questions:
  - What does a generic state design look like
    - Main elements and interfaces
    - Standard interfaces
    - How it all fits together
  - What do the core infrastructure systems do for the states
  - Where to find more information

The ITS/CVO Architecture is Part of the National ITS Architecture

- Architecture is a framework which lays out a blueprint for construction. The architecture defines:
  - the functions associated with ITS user services,
  - the physical entities or subsystems within which such functions reside,
  - the data interfaces and information flows between physical subsystems, and
  - the communications requirements associated with information flows.

Architectural Framework: A Way to Manage Complex Systems



Relationships Among the Architectures

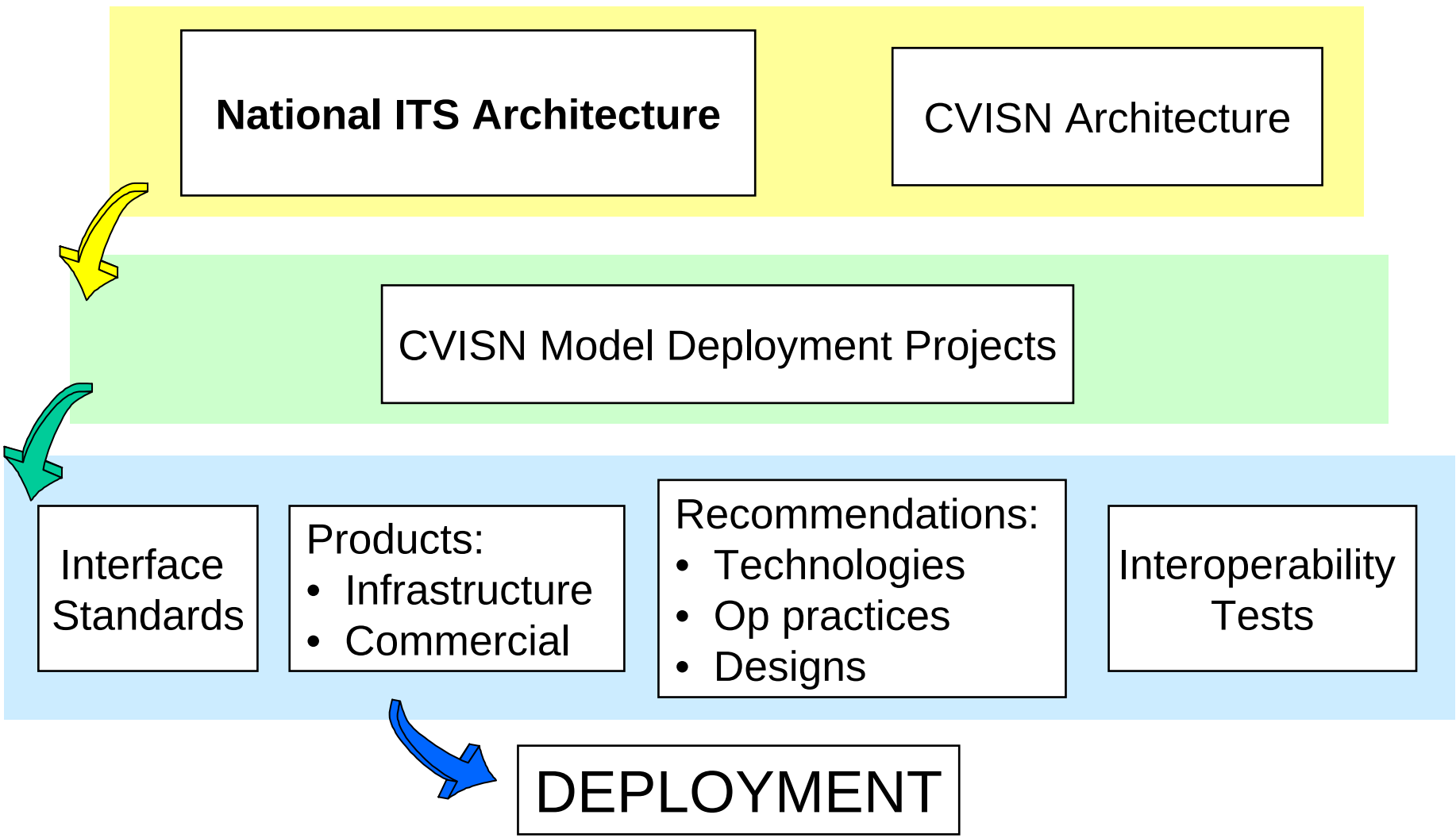
National ITS Architecture

The common framework for interoperability adopted by the US DOT Secretary, and which defines the functions associated with ITS user services; the physical entities or subsystems within which the functions reside; the data interfaces and information flows between physical subsystems; and the communications requirements associated with the information flows. The ITS/CVO elements are a subset of the National ITS Architecture.

CVISN Architecture

The ITS/CVO information systems and networks portion of the National ITS Architecture. The CVISN Architecture documentation begins with the National ITS Architecture and adds more detail in some areas (e.g., operational concepts and standardized interface requirements) to facilitate further development.

For CVO, the architectures are used to drive model & final deployments. CVISN Level 1 focused on early deployment of selected capabilities.



For CVO, the architectures are used to drive model and final deployments. CVISN Level 1 focused on early deployment of selected capabilities.

The CVISN architecture is derived from the National ITS Architecture and goes into more detail.

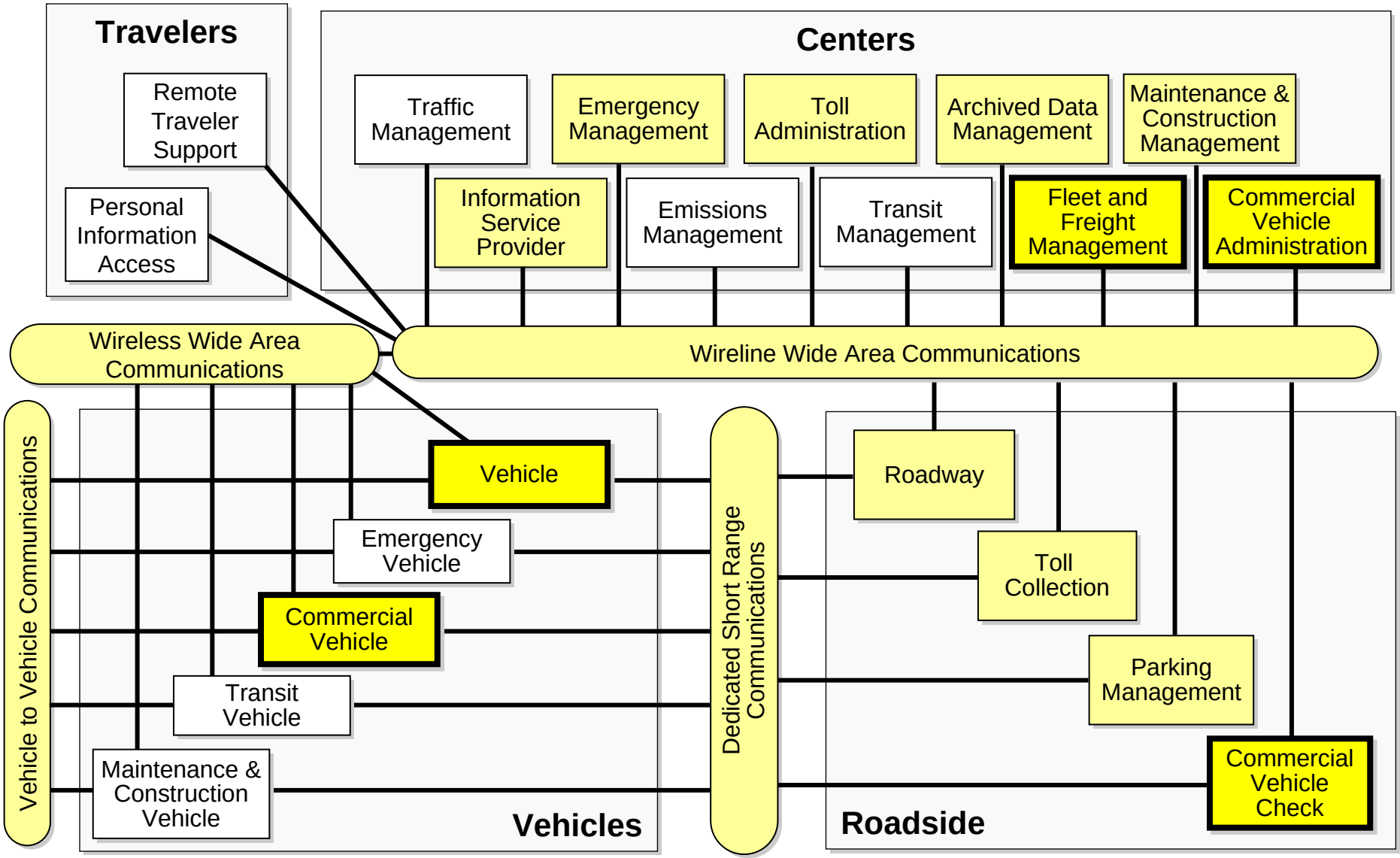
That additional detail provided sufficient guidance to the CVISN model deployment projects and IBC operational tests for them to do detailed design.

The projects produced interface standards, products, recommendations, and interoperability tests.

Those efforts lead to deployment of systems that should be interoperable.

CR 82, 103, 358

This version of the National ITS Architecture "Subsystems Interconnect Diagram" highlights the CVO subsystems



National ITS Architecture Subsystems Interconnect Diagram

The ITS subsystems communicate with each other using the communication elements and architecture interconnect channels shown in the 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 Commercial Vehicle Operations are shown with thick borders and those which 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.

The ITS architecture subsystems are grouped by classes where the subsystems may share common communication elements, deployment, and institutional characteristics. The classes of subsystems are Traveler Subsystems, Center Subsystems, Roadside Subsystems, and Vehicle Subsystems.

Traveler Subsystems provide the "personal" and portable platform for ITS functions of interest to a traveler for support of multimodal travel. No unique requirements are imposed by CVO on these subsystems.

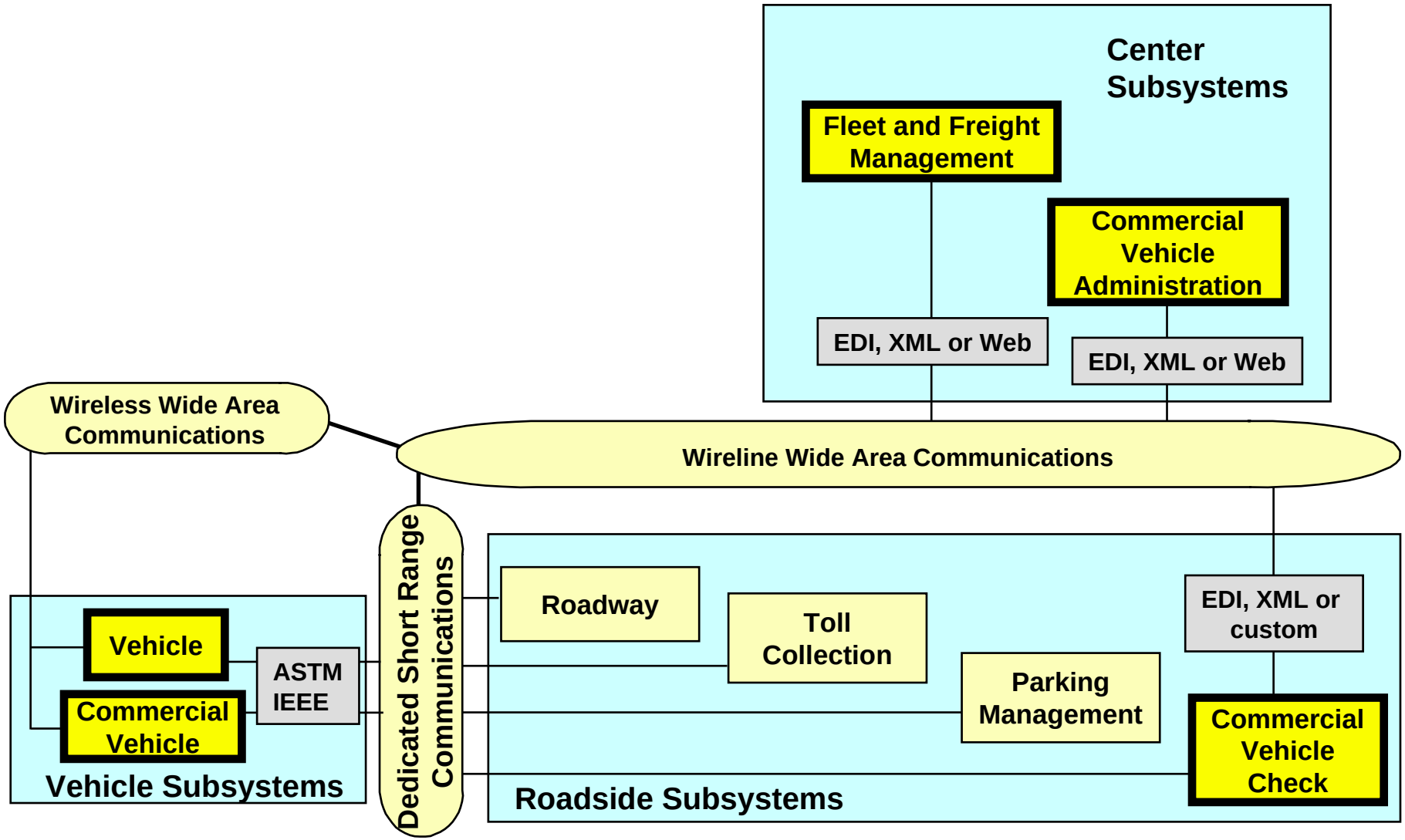
Center Subsystems are typically located at fixed sites. These subsystems provide management, administration, and support functions for the transportation system. These subsystems communicate with other centers to enable coordination with other agencies, between modes, and across jurisdictions. Center Subsystems provide electronic credentialing services for Commercial Vehicle Operations, support the roadside in screening and inspecting Commercial Vehicles, enable safe HazMat operations, support freight mobility, and provide services in common with other modes of transportation.

Roadside Subsystems include some functions that require convenient access to a roadside location for deployment of sensors, signals, programmable signs, or some other interface with travelers, vehicles, or freight. Roadside subsystems generally need wireline communications for messages to/from one or more Center Subsystems. For Commercial Vehicles, vehicle-to-roadside communications via a transponder mounted on the vehicle and a roadside reader will facilitate roadside check and inspection operations.

Vehicle Subsystems are installed in a vehicle. There will be considerable subsystem commonality across the various vehicle types in some areas such as navigation and Mayday functions. In addition to vehicle-to-roadside communications equipment, some Commercial Vehicles may be equipped with wireless wide area network communications to facilitate data communications with Center Subsystems such as Fleet and Freight Management.

The CVISN architecture connects subsystems via a combination of interface standards.

CR 82, SAFER XML



The CVISN architecture connects subsystems via a combination of interface standards.

This figure focuses on the ITS subsystems that support Commercial Vehicle Operations (CVO). The subsystems shown with thick borders are unique to CVO. The other boxes contain functions that support CVO and as well as other transportation elements.

The diagram highlights standardized interface types critical to the CVO portion of ITS: DSRC (Dedicated Short Range Communications), XML (eXtensible Markup Language), and EDI (Electronic Data Interchange). For information on interface standards, refer to the National ITS Architecture.

DSRC will occur via a transponder (tag) on the vehicle that is read from and sometimes written to by a roadside reader. The tag supplies an identifier and may also provide screening data, safety data, and HazMat flags unique to CVO. Standards for DSRC have been developed by the ASTM (American Society for Testing and Materials) and the IEEE (Institute of Electrical and Electronics Engineers).

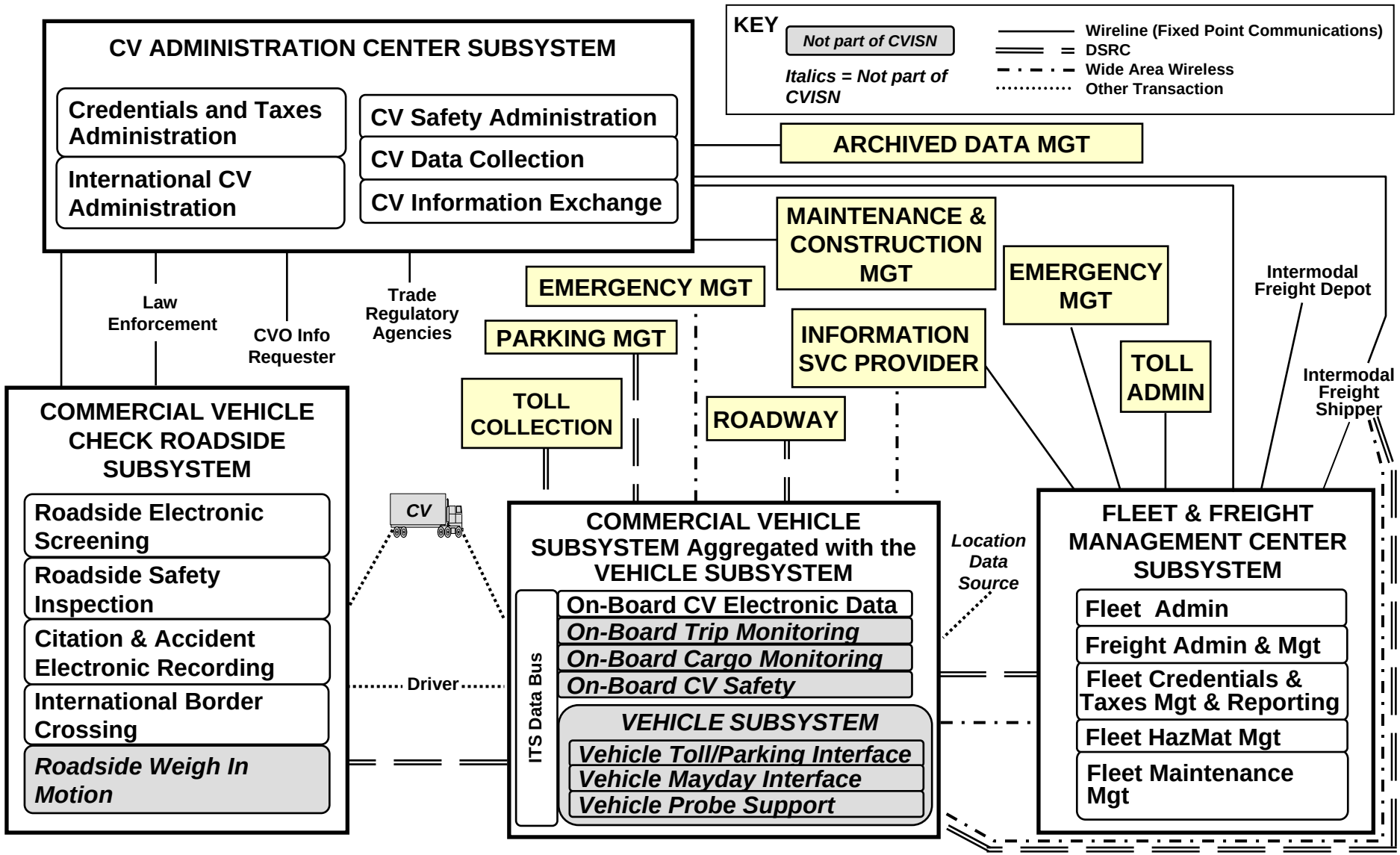
EDI transactions, as defined by ANSI Accredited Standards Committee (ASC) X12, may be used to communicate CVO-related business information among trading partners using pre-defined formats so that computers can process information such as credential applications, safety data, etc. EDI transactions are used for CVO data interfaces that must be standardized across jurisdictions.

XML is a project of the World Wide Web Consortium (W3C), and the development of the specification is being supervised by their XML Working Group. XML transactions provide an alternative to EDI for defining file formats for computer-to-computer information exchange (e.g., to fulfill a snapshot subscription). XML may also be used to support Web sites.

Web transactions may be used to communicate CVO-related business transactions between information systems and human users. Several states are implementing World Wide Web-based electronic credentialing. Some CVISN Core Infrastructure systems already offer, or are expected to offer, Web browser interfaces to CVO data.

The CVISN architecture includes the equipment packages and connections in the ITS/CVO architecture.

CR 82, 100, 103, 358



The figure shows how CVISN functions are allocated to subsystems and equipment packages.

Most CVO-unique equipment packages from the National ITS Architecture are part of the CVISN architecture.

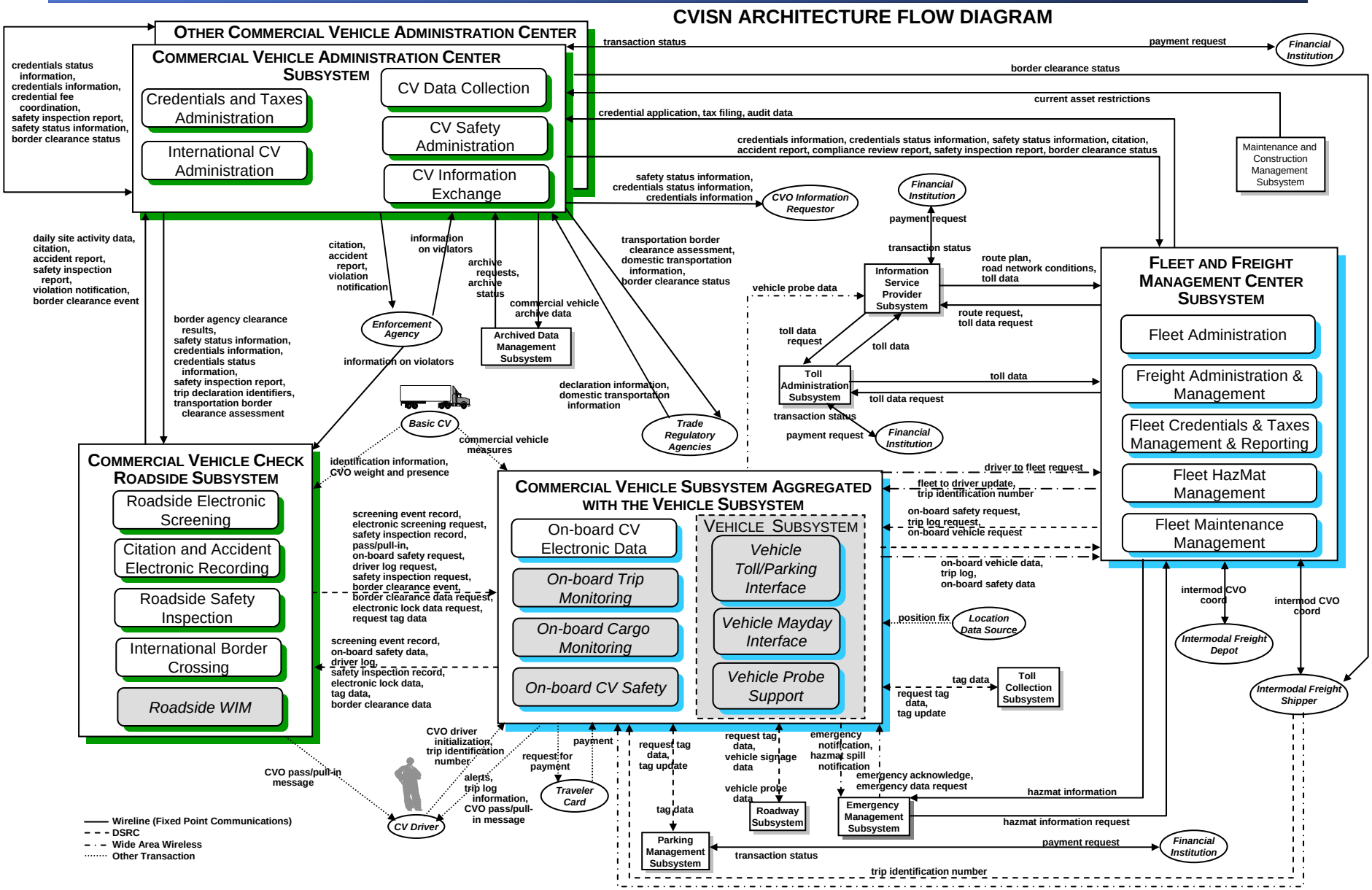
- The **Commercial Vehicle Administration Center Subsystem** consists of five equipment packages that are part of the CVISN architecture:
  - Credentials and Taxes Administration, supporting the processing, update, and issuance of CVO credentials; collection, processing, and review of CVO fees and taxes
  - International Commercial Vehicle Administration, supporting administrative functions associated with commercial vehicles crossing international borders
  - Commercial Vehicle Safety Administration, supporting the collection and review of CV (Commercial Vehicle) safety data
  - Commercial Vehicle Data Collection, supporting the archiving of CV data
  - Commercial Vehicle Information Exchange, facilitating the exchange of snapshots and reports containing safety and credentials information for drivers, carriers, and vehicles.
- The **Commercial Vehicle Check Roadside Subsystem**, consists of four equipment packages that are part of the CVISN architecture:
  - Roadside Electronic Vehicle Screening, supporting the screening and electronic clearance of vehicles
  - Roadside Safety Inspections, supporting automated safety inspections
  - Citation/Accident Electronic Recording, supporting the recording of information related to citations or accidents
  - International Border Crossing, supporting electronic screening at international borders for CVO.
- The **Fleet and Freight Management Center Subsystem** consists of five equipment packages that are part of the CVISN architecture:
  - Fleet Administration, supporting fleet tracking, dispatch, making and distributing route plans
  - Freight Administration and Management, supporting cargo tracking and trading partner interfaces
  - Fleet Credentials and Taxes Management and Reporting, supporting CV credential application, fee payment, and tax filing
  - Freight HazMat Management, communicating information about the location and handling of HazMat for incident response
  - Fleet Maintenance Management, providing the capability to use vehicle mileage and safety data to automatically generate maintenance schedules.
- The **Commercial Vehicle Subsystem** includes one equipment package that is part of the CVISN architecture:
  - On-Board Commercial Vehicle Electronic Data, supporting the communication of IDs and other status and messages from/to the vehicle and driver through DSRC and wireless communications.

The other CVO-unique equipment packages consist primarily of sensors. They do not contain significant information system or network components, so they are not considered part of the CVISN architecture. They will often interface with CVISN components to transfer the data collected.

The Vehicle Subsystem equipment packages are included to show those ITS services that are common to all vehicles, not exclusive to Commercial Vehicles.

The CVISN Architecture Flow Diagram and related data dictionary were used as the foundation for developing interface standards.

CR 82, 100, 103, 358



CR 82, 100, 103 ,358

CVISN Architecture Flow Diagram

The CVISN Architecture Flow Diagram depicts the CVO data flow among subsystems and between CVO subsystems and external entities. This diagram was used to coordinate with the National Architecture Team and to drive CVISN architecture refinement. The subsystems and equipment packages shown relate to the processes defined in the physical architecture. The flows were used to derive requirements for standardized information exchanges.

The CVISN Architecture baseline is in alignment with the National ITS and IBC Architectures as a result of activities that took place between 2000 and 2002. This diagram reflects the results of the alignment. For details, see JHU/APL document *CVISN Architecture* and its references.

Credential and Tax Administration processes are mapped to the Commercial Vehicle Administration Center Subsystem. Roadside Operations processes are mapped to the Commercial Vehicle Check Roadside Subsystem. Safety Assurance processes are split into the CV Safety Administration and Roadside Safety Inspection equipment packages. Vehicle operation processes are mapped to the Commercial Vehicle Subsystem and Vehicle Subsystem (shown as *Commercial Vehicle Subsystem Aggregated with the Vehicle Subsystem* on the flow diagram). Fleet Management Processes are mapped to the Fleet and Freight Management Center Subsystem. Archiving data from CV processes is mapped to the Commercial Vehicle Administration Center Subsystem. General ITS functions are depicted through interactions with general ITS subsystems from each of the CVO-unique subsystems.

Conventions used on the figure:

Entities external to the ITS information systems are shown in ovals, e.g., Enforcement Agency. In National Architecture terminology, these are “terminators.”

Connections and data exchanges shown on the figures are consistent with and follow the conventions of the National ITS Architecture. Different line types differentiate the means of communication used.

- Wireline (fixed point) communications are shown as solid lines.
- Wireless communications used for close proximity communications (DSRC) between vehicles and the immediate infrastructure are identified using long dashed lines.
- Wide Area Wireless communications, providing links via a wireless device between a user and an infrastructure-based system, are shown as dashed-dotted lines.
- Other transactions (National ITS Architecture’s Physical Interface, Human, Internal Vehicle Interface, Contact or Proximity Interface, or Position Location Interface) are shown as dotted lines.

CR 1084, 82, 895

CVISN System Design: Legacy & Planned Systems View

Commercial Vehicle Administration

Credentials and Taxes Administration Systems

- CDLIS
- NMVTIS
- IRP Clearinghouse
- IFTA Clearinghouse
- Driver Licensing
- Titling
- Vehicle Registration (IRP, Intrastate)
- IFTA (Registration, Tax Filing)
- HazMat (Registration, Permits)
- OS/OW
- SSRS
- Treasury
- Licensing & Insurance
- Electronic Screening Enrollment Web Site
- Credentialing Interface (CI)

Safety Administration Systems

- MCMIS
- SAFETYNET
- CAPRI
- Access to NLETS

CV Information Exchange Systems

- SAFER
- State CV Info Exchange Window (CVIEW)
- Query Central

CV Data Collection

International CV Administration Systems

- International Trade Data System

Fleet & Freight Management

- Fleet Administration Systems
- Freight Administration & Management Systems
- Fleet HazMat Management Systems
- Fleet Credentials & Taxes Management & Reporting Systems
  - Carrier Automated Transactions (CAT)
  - Internet Tools
- Fleet Maintenance Management Systems

Commercial Vehicle Aggregated with the Vehicle Subsystem

Boxes shown with dashed borders are part of the ITS/CVO architecture but not part of the CVISN architecture.

Commercial Vehicle Subsystem

On-Board CV Electronic Data Systems

- Standard DSRC transponder,
- Wireless Comm

- On-Board Trip Monitoring Systems
- On-Board Cargo Monitoring Systems
- On-Board CV Safety Systems

Vehicle Subsystem

- Vehicle Toll/ Parking Interface
- Vehicle Mayday Interface
- Vehicle Probe Support

Commercial Vehicle Check

Roadside Electronic Screening Systems

- Screening
- Roadside Operations Sensor/Driver Comm

Roadside Safety Inspection Systems

- ASPEN, ISS-2, PIQ

Citation and Accident Electronic Recording Systems

International Border Crossing Systems

- Roadside Weigh In Motion Systems (stand-alone)

The CVISN System Design takes the architecture down a level.

The CVISN System Design - Legacy & Planned Systems View shows the transition from “architecture” to “top-level system design”. In the architecture drawings, the functional subsystems are shown, but the specific existing or planned systems are not. In this top-level system design, legacy systems that handle specific CVO functions are shown. Systems planned to support emerging ITS functions are also shown.

On this diagram, the legacy and planned systems are shown in the subsystem and equipment package groupings that were used in the National ITS and CVISN Architecture drawings shown earlier.

To communicate design concepts more readily to CVISN stakeholders, other drawings have been developed. Those form the basis for the remainder of this document.

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CVISN System Design Description
2 - System Requirements

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The initial CVISN deployments are focused on three primary capability areas.

Safety Information Exchange: Provides carrier, vehicle, and driver safety information to roadside enforcement personnel and other authorized users.

Credentials Administration: Provides for electronic application, processing, fee collection, issuance, and distribution of CVO credentials, support of base state agreements, and provides for CVO tax filing/auditing.

Electronic Screening: Provides for automated screening of vehicles that pass a roadside check station, determining whether further inspection or verification of credentials is required, and taking appropriate actions. Vehicle-to-roadside communications via transponders and readers facilitate the screening functions at mainline speed. Weigh-In-Motion provides for high speed, mainline weighing. This ITS/CVO capability may be implemented at either fixed or mobile sites.

This chapter depicts the results of requirements analysis for these three capability areas.

For each capability area, this chapter provides:

- A functional view
- Overview of functions included in the capability, and expected benefits
- A design view
- Text describing the design view

For simplicity, in many cases “CVIEW” is used in place of “CVIEW or CVIEW equivalent.”

The operational concepts and top-level design requirements for CVISN Level 1 are recorded in detail in the COACH (CVISN Operational and Architectural Compatibility Handbook) Part 1.

The CVISN technical guides provide further amplification of concepts and design guidance:

- CVISN Guide to Top-Level Design
- CVISN Guide to Safety Information Exchange
- CVISN Guide to Credentials Administration
- CVISN Guide to Electronic Screening

The COACH Part 4 defines the Interface Specifications for CVISN.

CVISN Level 1
Deployment Summary

- CVISN is the collection of information systems and communications networks that provide support to commercial vehicle operations (CVO).

- The definition of CVISN Level 1 has been baselined to allow definition of a specific set of initial capabilities that can be deployed by a state and its motor carriers. In the future, additional capabilities may be added to CVISN.

- Interface standards either exist or are being developed to support CVISN Level 1 capabilities.

Definition of CVISN Level 1 Deployment

- **An organizational framework for cooperative system development has been established among state agencies and motor carriers.**

- **A State CVISN System Design has been established that conforms to the CVISN Architecture and can evolve to include new technology and capabilities.**

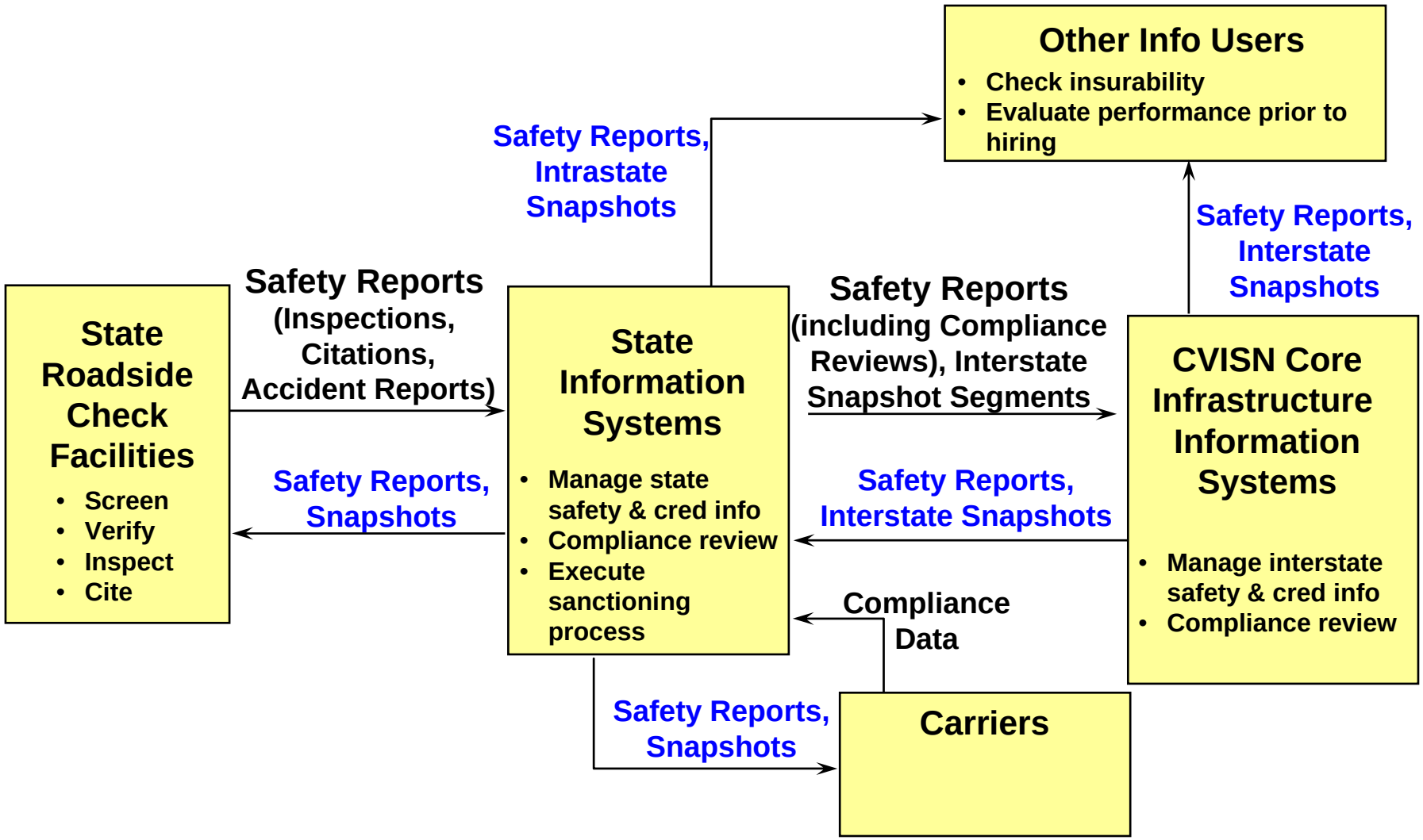
- **All the elements of three capability areas (below) have been implemented using applicable architectural guidelines, operational concepts, and standards:**
  - **Safety Information Exchange**
    - Inspection reporting using ASPEN (or equivalent) at all major inspection sites. ASPEN data sent to SAFER (Safety and Fitness Electronic Records) directly or indirectly.
    - Connection to the SAFER system to provide exchange of interstate carrier and vehicle data snapshots among states.
    - Implementation of CVIEW (or CVIEW equivalent) system for exchange of intrastate and interstate data within state and connection to SAFER for exchange of interstate data through snapshots.

      -- OR --
    - Utilization of SAFER option for exchange of inter- and intrastate data through snapshots.
  - **Credentials Administration**
    - Automated electronic processing via Web-based or computer-to-computer solutions from carrier to State (processing includes carrier application, state application processing, credential issuance, and tax filing) of at least IRP (International Registration Plan) and IFTA (International Fuel Tax Agreement) credentials; ready to extend to other credentials (intrastate, titling, OS/OW (Oversize/Overweight), carrier registration, HazMat). Note: Processing does not necessarily include e-payment.
    - Update SAFER with credential information for interstate operators as actions are taken.
    - Update CVIEW (or equivalent) with interstate and intrastate credential information as actions are taken.
    - Connection to IRP & IFTA Clearinghouses.
    - At least 10% of the transaction volume handled electronically; ready to bring on more carriers as carriers sign up; ready to extend to branch offices where applicable.
  - **Electronic Screening**
    - Use snapshots to support screening decisions.
    - Implemented at a minimum of one fixed or mobile inspection site.
    - Ready to replicate at other sites.

To support all three capability areas, snapshots are assembled and stored by SAFER and CVIEW to facilitate the exchange of safety and credentials information among systems.

- There are 3 kinds of snapshots: carrier (available now), vehicle (available now), and driver (not yet available, but proposed for the future).
  - The use of common identifiers allows agencies and jurisdictions to exchange information
  - Identifiers, census/demographic information, safety history summary, and credentials information are included in snapshots
- Limited DMV (Department of Motor Vehicles) data are included in the snapshots
  - Vehicle apportionment data
  - Credentials check flags are included. A check flag is used to indicate a recent problem, but does not attempt to define current status.

Safety information exchange is intended to improve safety performance.

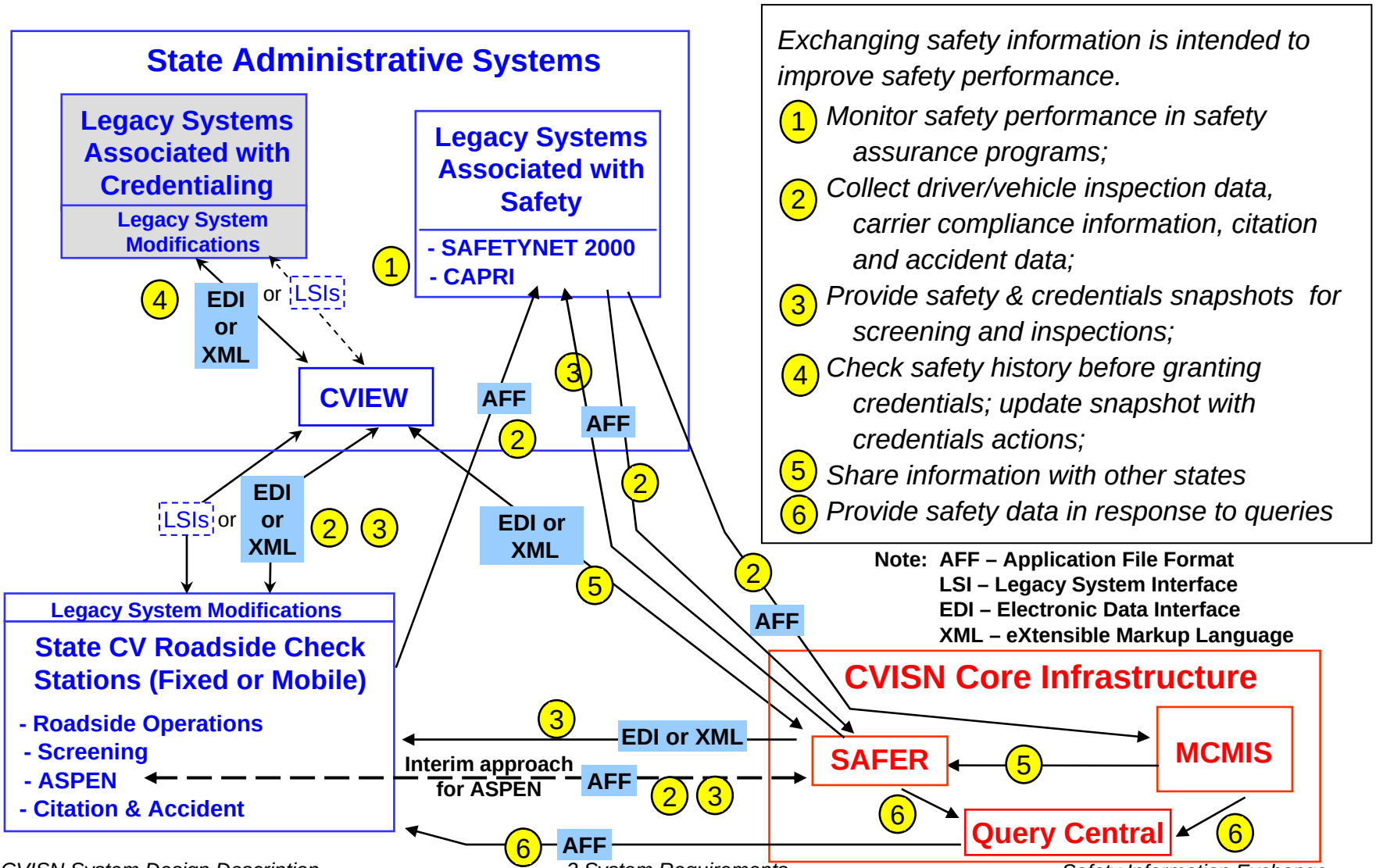


Safety Information Exchange

- The Safety Information Exchange capability area includes:
  - Automated collection of information about safety performance
  - To augment the safety information, automated collection of credentials information
  - Improved access to carrier, vehicle, and driver safety and credentials information
  - Proactive updates of carrier, vehicle, and driver* snapshot information
    (* no consensus yet for including driver data in the snapshot)
  - Support for programs that identify and encourage unsafe operators to improve their performance
- Expected benefits are:
  - Improved safety performance
  - Increased scrutiny of safety performance by the insurance industry
  - Focusing government resources on high risk operators
  - Providing carriers with better information to manage their safety programs

Safety Information Exchange: Standardized transactions and common identifiers also make it possible to check safety performance roadside and deskside.

CR 861, 877, 895, SAFER XML



CR 101, 895, SAFER XML

Safety Information Exchange

For safety information exchange, the design elements include state and federal commercial vehicle credential and safety administration-related offices, roadside check stations (fixed and mobile), and information exchange systems [e.g., MCMIS (Motor Carrier Management Information System), SAFER (Safety and Fitness Electronic Records), SAFETYNET, CAPRI (Carrier Automated Performance Review Information), state CVIEW (CV Information Exchange Window), Query Central].

The primary state administrative offices include the designated lead Motor Carrier Safety Assistance Program (MCSAP) agency, SAFETYNET, and other enforcement activities. Other state agencies also provide or have an interest in commercial vehicle safety information (e.g., vehicle registration, driver licensing, titling, permitting). These offices exist in each state or region, and share information through various CVISN core infrastructure systems.

The state CV Information Exchange Window (CVIEW) system supports the transfer of safety and credentials information (SAFER-style snapshots and reports) within the state and with the SAFER system. The state CVIEW handles information about all carriers, vehicles, and any drivers who operate in the state (both intrastate and interstate operators).

The CVISN core infrastructure supports the exchange of safety information between states, and among other stakeholders. The primary safety-related information systems and networks include SAFER, Commercial Driver License Information System (CDLIS), MCMIS, and Query Central. Other information systems and networks that support law enforcement and credentialing activities, such as the National Law Enforcement Telecommunications System (NLETS) and the National Motor Vehicle Titling Information System (NMVTIS), are also used to support the exchange and use of safety information.

Roadside check stations include those locations with a permanent structure or mobile facility (including police cruisers) that house elements of the inspection and information systems (e.g., computers and communication systems) and enforcement and safety inspection personnel.

The CVISN initiative supports the standardization of dataflows to carry summary (snapshot) and detailed (report) safety and credentials information. These dataflows will provide a consistent basis for automating CVO information exchanges and processing, and to ensure interoperability among existing and developing CVO information systems. With the delivery of SAFER Version 4.2, XML transactions will be available for snapshot exchange.

CR 72, 861, SAFER XML

Safety Information Exchange

The “SAFER option”, that is, a state using the functionality of SAFER rather than deploying its own CVIEW, is a future possibility. The State-led SAFER Option Working Group has concluded that it is feasible to directly use SAFER to receive and distribute carrier and vehicle safety, credentialing, and transponder data for all interstate carriers and, where possible, for intrastate carriers, without an intermediate CVIEW. States should consider the SAFER option when reviewing design alternatives.

SAFER Versions 1 though 3 provide snapshot data to CVIEW using EDI. That is the mechanism by which the FMCSA-developed CVIEW currently receives data from SAFER. With the release of SAFER Version 4, XML will become the official interface. EDI will continue to be available in the near term, but the EDI interface will not be updated. States are encouraged by FMCSA to transition to XML.

SAFER also responds to EDI queries for snapshots. In the FMCSA-developed version of CVIEW, however, snapshot queries (carrier only) are sent to SAFER via remote procedure call (RPC), not EDI. The RPC capability was implemented in both SAFER and CVIEW to improve performance for the near-term, but its long-term support is uncertain and continued availability is not guaranteed. States can enhance the FMCSA-developed CVIEW by implementing EDI snapshot queries. In the future, the snapshot interface is expected to be Web-based, using XML and HTTP. States should take a Web-based approach to future developments and enhancements.

The snapshots convey information about three major entities: carriers, vehicles, and drivers. Only carrier and vehicle snapshots are part of CVISN Level 1. To minimize response time to requesters, snapshots will be stored nationally in the SAFER system, and within the state in the CVIEW system.

SAFER/CVIEW snapshots are used for screening carriers and vehicles at mainline speeds at roadside check stations, for safety inspections, for limited credentials checking and insurance applications, and for industry self-checks. Different subsets (called “views”) of the snapshot records available in SAFER/CVIEW will support different user systems.

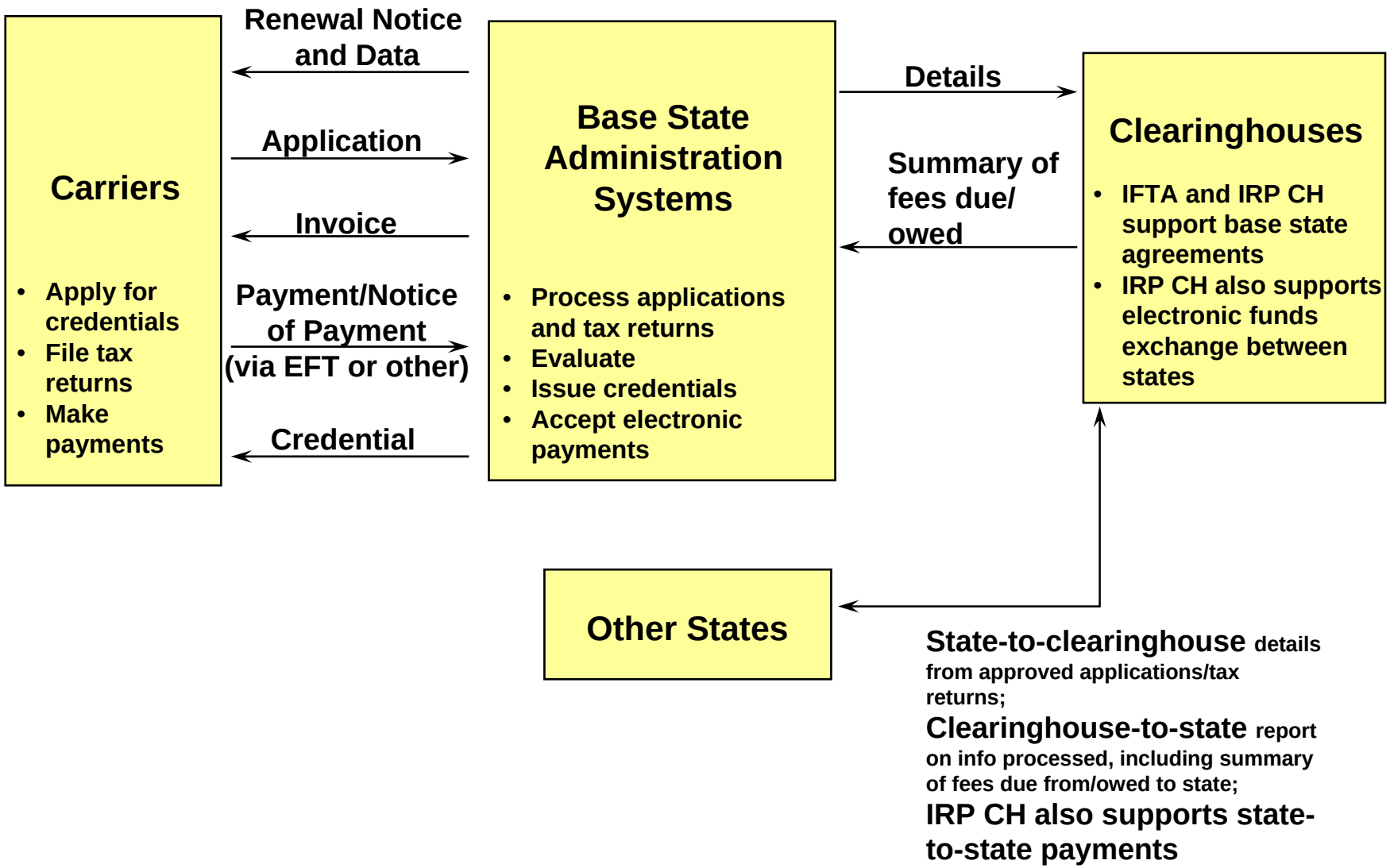
Web transactions may be used to communicate safety information between information systems and human users. SAFER offers access to some carrier data via a Web site.

Handling Data from Multiple Systems: SAFER/CVIEW Requirements

NOTE: These requirements are included here as suggestions for states to consider as they maintain and use snapshots internally, and as a "heads-up" for changes that may be forthcoming in SAFER.

- For any given snapshot, there can be only one authoritative source (or group of authoritative sources, such as ASPEN units) for each field in that snapshot.
- For convenience, all fields provided by a single authoritative source should be grouped into an "update view." (In this case, we exclude SAFER and CVIEW from the list of authoritative sources, since they are really acting on behalf of authoritative sources.)
- To support that idea, several new views are recommended:
  - Vehicle: OS/OW permit, HazMat permit, IRP trip permit, Titling, Intrastate Registration
  - Carrier: OS/OW permit, HazMat permit, Operating Authority
- The procedures for defining new views and update privileges in SAFER/CVIEW should be documented and explained to interested stakeholders.
- As a new authoritative source is ready to provide updates to SAFER/CVIEW, the SAFER/CVIEW database should be configured to identify which fields and which snapshots the new source will update. The definition should include identifying the view(s) to be provided by the source, and the verification criteria. The criteria may involve checking that one or more fields in the data provided by the authoritative source has a certain value or range of values. For instance, the MD IRP system should be able to send in the IRP view for vehicles that are based in MD for IRP.
- Only the authoritative source should be allowed to update a snapshot data field, with the following exception:
  - A "super user" can update any field. An audit trail should be maintained to record super user updates.
- SAFER/CVIEW should validate the sender's identity through some industry-standard means (account ID, IP address, password, security keys, . . .).
- Updates attempted by any system other than the authoritative source or a super user should be rejected with a code explaining why. The rejection transaction should be returned to the sender in a timely fashion. The rejection should be logged for the SAFER/CVIEW administrator to review.

Improved credentials administration should make government and business more efficient.

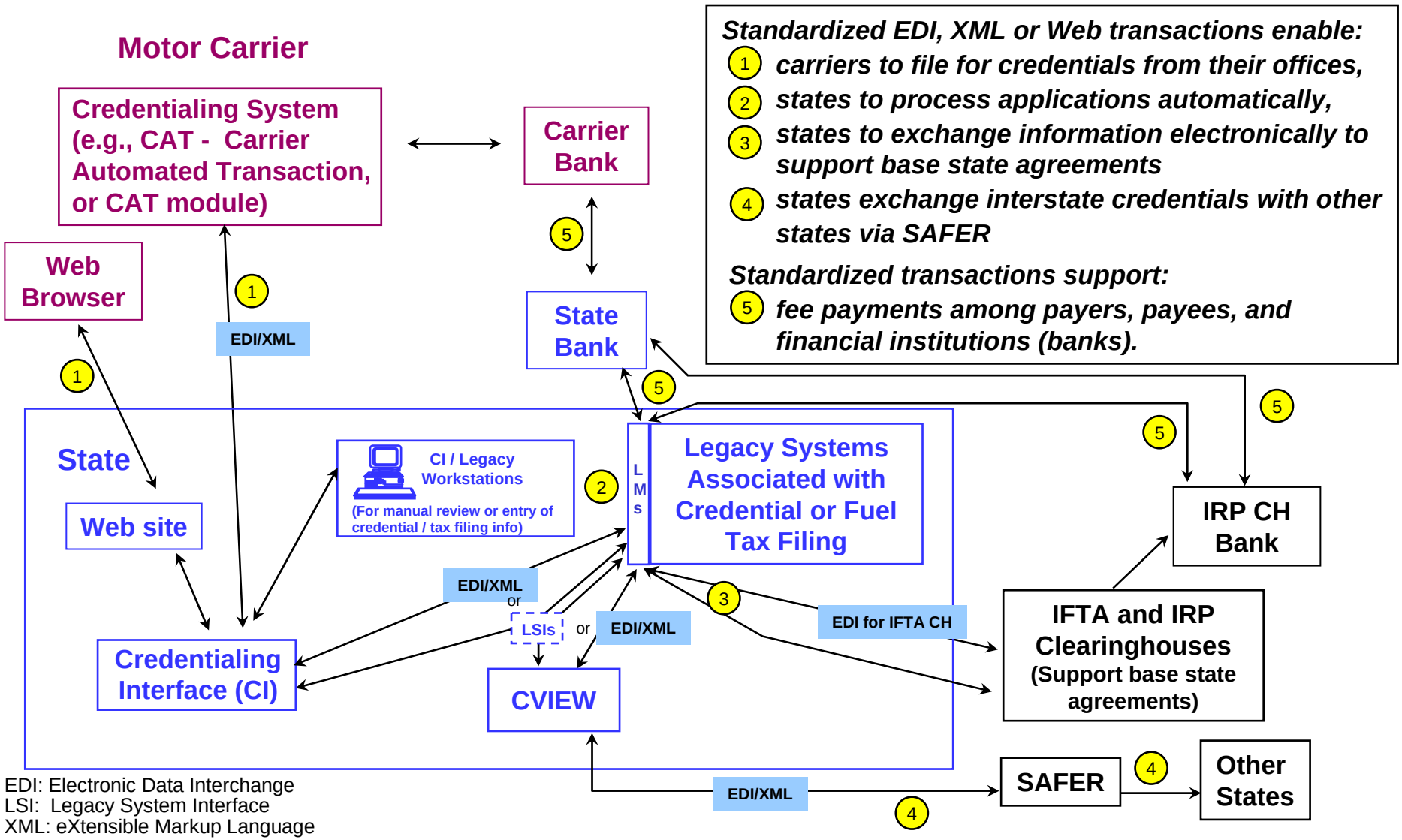


Credentials Administration

- The Credentials Administration ITS/CVO capability area includes:
  - All aspects of applying for, reviewing, and granting CVO credentials **(IFTA, IRP**, Intrastate Registration, Carrier Registration, OS/OW Permits, HazMat Permits, Titling, Electronic Screening Enrollment); paying the associated fees
  - Filing returns on fuel taxes; paying the associated taxes
  - Managing information about credentials and tax payment status
  - Providing information to roadside enforcement and administrative users
  - Supporting base state agreements and associated fee payment reconciliation
- Expected benefits are:
  - Reduced cost and red tape for agencies and carriers
  - Improved regulatory compliance
  - Improved carrier efficiency in getting new vehicles on the road
  - Improved access to credential status information for roadside users.

Credentials Administration: Various approaches enable different carriers to obtain credentials and enable states to process the applications and support base state agreements electronically.

CR 90, 861, SAFER XML



EDI: Electronic Data Interchange
LSI: Legacy System Interface
XML: eXtensible Markup Language

Credentials Administration

CR 90, 861

The design elements involved with credentials administration include the state Web site, the carrier's credentialing system (e.g., Carrier Automated Transaction (CAT)), the carrier's Web browser, the state Credentialing Interface(CI) system, communications system(s) that facilitates the exchange of information between the carriers and the state, state legacy systems associated with individual credentials, and the IRP and IFTA clearinghouses in the CVISN Core Infrastructure. The state Commercial Vehicle Information Exchange Window (CVIEW) and SAFER supports the exchange of credentials-related information via snapshots.

This design allows carriers, owners, and drivers to apply for, pay for, and receive credentials electronically. It also supports states/regions in the administration of credentials, collecting and distributing funds, and in storing and distributing credentials-related data. The design also establishes standard mechanisms (the snapshots) for states to provide credentials information to enforcement officials and other authorized stakeholders.

Many elements exchange credentials-related information using Web standards. Some elements exchange information with each other through standardized ANSI ASC X12 Electronic Data Interchange (EDI) transactions. XML transactions could also be used. The system elements are virtually linked through government and commercial network services. Proprietary or sensitive information is protected from inadvertent disclosure through network "firewalls", business practices, and procedures.

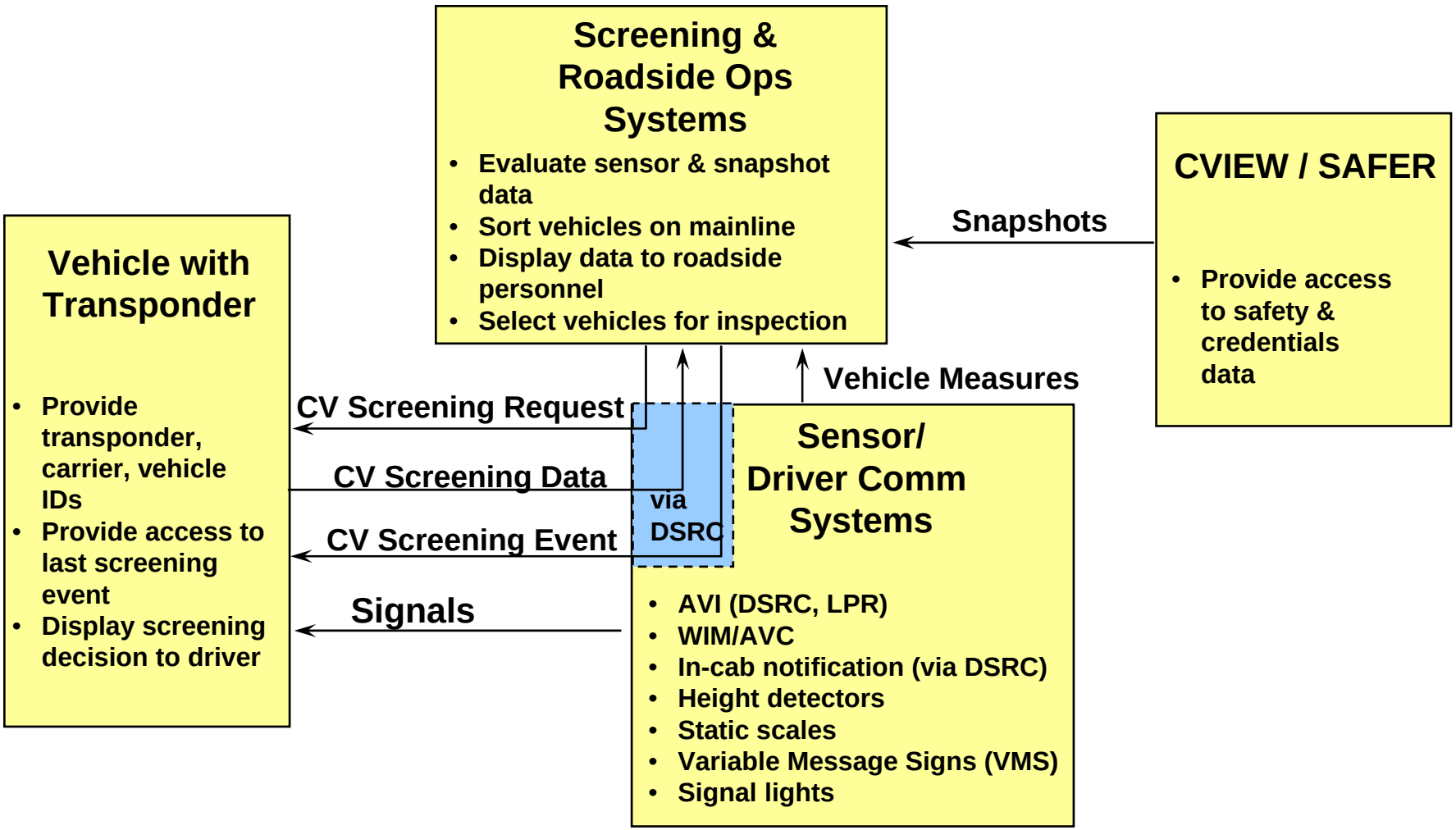
A **credential** is defined to be the authority granted by the issuing jurisdiction. Today, most credentials are issued in paper form, with supporting records on file in the issuing jurisdiction's system. An **electronic credential** is an electronic record of the credential.

The authoritative source for an electronic credential is the issuing agency. The holder of the credential may be issued an electronic copy that represents the same authority as today's paper copy.

To support base state arrangements, states must collect fees from operators, apportion the fees collected to other states according to pre-determined criteria, and transfer funds to those states accordingly. To facilitate that process, the design shown here involves **clearinghouses** to support those financial reconciliation activities. This design centralizes the financial reconciliation required by base state agreements. The clearinghouses could also be used to facilitate other kinds of information exchange. For instance, the clearinghouses could support audits, and provide a consolidated reporting database.

To conform with the CVISN architecture, participants implement either computer-to-computer or person-to-computer (Web) interfaces for public-private interactions. X12 EDI transaction sets (TS) as described in the COACH Part 4 are available, and the EDI Implementation Guides (IGs) provide additional details about the usage of each transaction set. XML transactions could be used, but no nationwide stakeholder group has developed XML guidance for CVO credentials.

Electronic screening is intended to focus enforcement resources on risky operators, and to improve freight mobility.



Electronic Screening

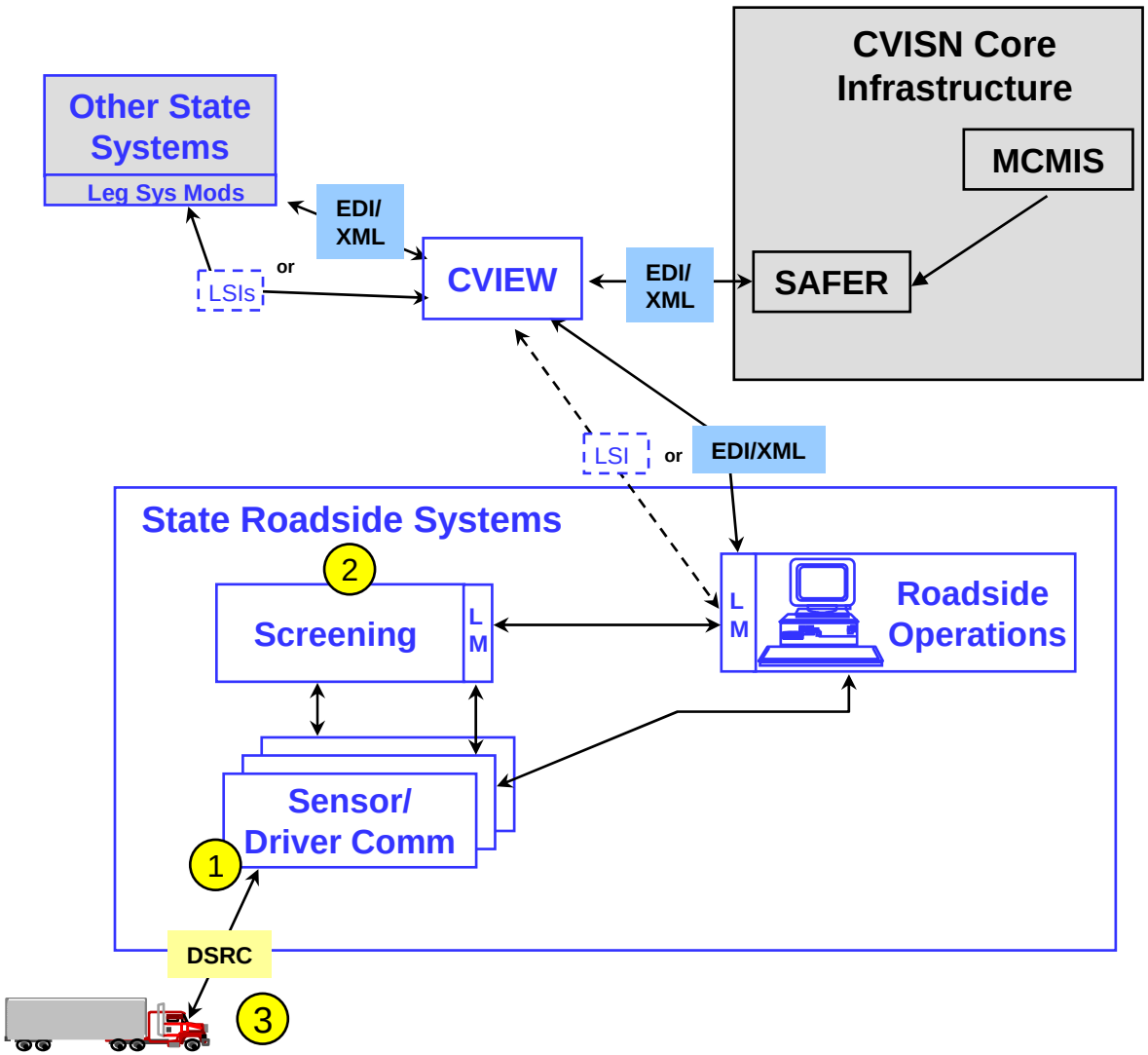
Screening: A selection mechanism to make efficient use of limited fixed weigh station and inspection resources.

Electronic Screening: Application of technology to the screening process to make an informed decision whether further examination of a vehicle is required.

- The Electronic Screening capability area provides for:
  - Screening vehicles that pass a roadside check station based on identifiers read from the transponder, correlated with safety and credentials information from snapshots
  - Identifying overweight, oversize, and improperly credentialed vehicles
  - Determining whether further inspection or verification of credentials is required & taking appropriate actions
- Expected benefits are:
  - Focusing resources on high risk operators
  - More efficient movement of freight, since safe and legal operators will be pulled in less often

E-Screening uses the safety and credentials information in snapshots and real-time measurements to make the screening decision.

CR 861, SAFER XML



Roadside electronic screening focuses resources on high risk operators:

1. ***Identify transponder, carrier, vehicle via DSRC transponder & standard messages***
2. ***Check snapshot information when making screening decisions***
3. ***Inform Driver via transponder***

Notes:

- ***Pull in untagged vehicle to identify carrier & vehicle; can still use snapshot to help make inspect/not inspect decision***
- ***Before issuing a citation, check with authoritative source for latest status***

Electronic Screening

For electronic screening, the major design elements include vehicles, manned fixed or mobile roadside check stations, the state commercial vehicle information exchange system window (CVIEW), the state CV safety administration, and various multi-state information systems.

Vehicles are equipped with electronic tags (transponders) that support dedicated short range communications (DSRC) and are integrated with an in-cab display (visual and audio) used for driver notification. Various techniques may be used to store driver and load information on the tag. Vehicles typically interface with screening equipment at mainline speed and drivers are notified of bypass status via the in-cab device.

Fixed commercial vehicle roadside check stations are manned locations with a permanent structure that can house elements of the information system (e.g., computers and communication systems). The stations are equipped with dedicated short range communications (DSRC) systems for interfacing with tagged vehicles. License plate readers may be used to identify untagged vehicles. Fixed sites are usually equipped with some weighing device (weigh-in-motion (WIM) device or a static scale) and a variable message sign (VMS). A more sophisticated configuration includes a screening WIM device integrated with an automated vehicle classification system to perform weight, size, and length checks, and a static scale to measure weight more precisely when the vehicle is stopped. If the WIM and automatic vehicle classification (AVC) system are located in the roadway on the mainline, then "screening" (making pass/pull-in decisions) can be performed at mainline speed. Manned fixed sites are likely to be co-located with a safety inspection facility.

Mobile enforcement units can be equipped with various combinations of DSRC, automatic vehicle identification (AVI), AVC, and WIM systems. They are typically positioned in areas where violations are known or suspected to occur. These units are equipped with tag readers that allow them to interface with vehicle transponders and mobile computers that look up credential and safety records either locally or stored in the infrastructure.

State administration systems support electronic screening operations by providing CVO data required for electronic clearance. The results of roadside activities (vehicles that were seen and cleared, seen and stopped, inspected, citations issued, number of vehicles that passed the station, etc.) are provided to the state CV safety administration.

Core infrastructure systems such as CDLIS may be queried either directly or indirectly to gather safety, license, and enforcement information about the carrier, vehicle, and driver.