3 WHAT ALREADY EXISTS?

A large body of knowledge and experience already exists for deploying electronic screening systems and technologies. Member states of two major multi-state electronic screening programs, Heavy Vehicle Electronic License Plate (HELP) PrePass™ and North American Preclearance and Safety System (NorPass), have deployed a number of sites that are currently in operation. The CVISN Pilot and Prototype states have completed or are in the process of developing electronic systems that meet CVISN Level 1 requirements.

Software products and design documents, developed for CVISN with FMCSA funds, are available in the public domain. These products include the Roadside Operations Computer (ROC), screening computer, Commercial Vehicle Information Exchange Window (CVIEW), and E-screening enrollment applications.

3.1 Programs

Heavy Vehicle Electronic License Plate (HELP) PrePass™ is the largest North American electronic screening program with operational sites in Alabama, Arizona, Arkansas, California, Colorado, Illinois, Mississippi, Montana, New Mexico, Oklahoma, Tennessee, West Virginia, and Wyoming. The PrePass™ central site manages pre- and post-enrollment verification checks of carriers and provides transponders for vehicles. At the roadside station, transponder-equipped vehicles are checked against a pre-clearance list and weighed using WIM equipment. More information can be found at the HELP PrePass™ website: http://www.cvo.com/.

As of this date, states participating in HELP PrePass™ do not meet the CVISN Level 1 Roadside requirements. The primary shortcoming is not using snapshot data as the basis for safety and credential checks. California (CA), one of the CVISN Pilot states and a HELP PrePass™ member, has developed a roadside systems design that should meet CVISN Level 1 requirements, when deployed. States that are current members of HELP PrePass™, or considering joining the program, may want to use the CA electronic screening design as a starting point in their development.

North American Preclearance and Safety System (NorPass) was created in the merger of Advantage CVO and Multi-jurisdictional Automated Preclearance System (MAPS). States which have signed the NorPass agreement include: Florida, Georgia, Kentucky, Louisiana, Oregon and Washington. Information based on safety and credential records is passed to the roadside stations via an enrolled vehicle list. Weight enforcement may be conducted using WIM, prior event data, or weight compliance history. For more information on NorPass, contact Gene Bergoffen (E-mail: GENE.BERGOFFEN@saic.com].

Kentucky (KY) and Washington (WA), two CVISN Pilot states that are also NorPass members, are nearing completion of electronic screening sites which should meet the roadside CVISN Level 1 requirements. Both KY and WA are scheduled to conduct the CVISN Interoperability roadside tests in late 1999.

Virginia (CVISN Prototype State) has implemented electronic screening, based on the CVISN architecture, at the Stephens City inspection station. By successfully conducting several of the CVISN Interoperability tests, Virginia became the first state to meet the roadside CVISN Level 1 requirements. Virginia is moving forward with enrolling carriers and distributing transponders; development of a mobile screening van (NOMAD); and implementation of electronic screening at a second fixed site (Suffolk).

3.2 Products

Commercial Vehicle Information Exchange Window (CVIEW) systems are used in some states to store and exchange safety and credential data. In CVISN Level 1, there is a requirement to implement a system called CVIEW or its equivalent for snapshot exchange within the state. The functions that CVIEW, or its equivalent, will perform are listed below.

- Provide for the electronic exchange of state-based interstate carrier and vehicle credential data between state source/legacy systems, users, and SAFER
- Provide for the electronic exchange of intrastate carrier and vehicle snapshot data between state source systems and users
- Serve as the repository for a state-selected subset of interstate carrier and vehicle safety and credential data
- Serve as the repository for a state-selected subset of intrastate carrier and vehicle safety and credential data
- Provide inter- and intrastate carrier and vehicle safety and credential data to the roadside to support electronic screening and other roadside operations.

The JHU/APL-generated version of the CVIEW software is available to states at no cost.

Roadside Operations Computer (ROC) software provides an operator interface for inspection station personnel and performs the following functions:

- Process snapshots and control site traffic.
- Interface to CVIEW – get snapshot data
- Support legacy operator interfaces [Static Scale, Commercial Driver's License Information System (CDLIS), National Law Enforcement Telecommunications System (NLETS), Traffic Flow]
- Control "pull around back" messages and signal lights
- Interface to the Screening Computer (send criteria, get screening results, get sensor data, send snapshot summaries)
- Interface to report activities from other roadside systems to infrastructure, and vice versa
- On request, retrieve report data and display
- Process snapshot data into local database
- Track position of each vehicle moving through the station
- Allow operators to set/view screening criteria
- Display sensor data to operator

- Display snapshot data to operator
- Display vehicle position data to operator (e.g., mainline, ramp, scale lane, inspection area)

The JHU/APL-generated version of ROC software developed for Maryland and Virginia is available to states at no cost.

Screening Computer software receives screening criteria from the ROC and collects inputs from all roadside sensors. An algorithm implemented in the Screening Computer is used to make the screening decision based on sensor inputs and the screening criteria. The specific functions of the Screening Computer are as follows:

- Make pass/pull-in decision
- Interface to sensor/driver communications system
- Interface to Roadside Operations system (get snapshot summaries, send sensor data, send screening results)
- Sort vehicles on mainline or ramp, using: sensor data, snapshot data, availability of inspector, operator configuration selections
- Output screening results to tag via DSRC (includes driver notification)
- Control screening messages and signal lights
- Configure screening based on operator control (via Roadside Operations system) data

Screening Computer software for Maryland is being developed by JHU/APL and will be made available to states at no cost.

Model Mainline Automated Clearance System (MACS) performs electronic screening based on snapshot data received from SAFER/CVIEW. The functions provided by MACS are equivalent to the combination of the ROC and Screening Computer. The MACS software is available from the Kentucky Transportation Center at no cost to states.

3.3 Data

Safety and Fitness Electronic Records (SAFER) is a CVISN Core Infrastructure system, which collects and distributes snapshots. Snapshots contain safety and credentials information to support safety assurance, credentials administration, and electronic screening activities.

In electronic screening, snapshots are exchanged between SAFER and CVIEW; and also sent to the roadside systems using the American National Standards Institute (ANSI) Accredited Standards Committee (ASC) X12 EDI transaction sets (TS). TS 285 is used for exchange of snapshots and snapshot segments. Figure 3-1 summarizes the snapshot data stored in SAFER/CVIEW.

Data → ↓Snapshot	Identifier/Census Data	Safety Information	Credential Information
Carrier	[1]Primary Carrier ID; Other IDs (e.g., Taxpayer ID, DUNS, IRP account, etc.); Names; Addresses; Type; Operations Characterization	Safety Ratings; Accident, Inspection & Violation Summaries; Safety Review History; [1] Last OOS; PRISM Data	Carrier Registration; Fuel Tax Data Insurance Data; HazMat Registration; [1]Permit Data; Electronic Screening Enrollment; Carrier Check Flags (e.g., IRP & IFTA flags)
Vehicle	[1]VIN; [1]Vehicle Plate ID Other IDs (e.g., Plate, IRP Account, CVIS Default Carrier, Transponder, Title Number); Vehicle Description	Last Inspection Overview; Inspection & Violation Summaries; [1]Last OOS; CVSA Decal Data; PRISM Data	Apportionment (i.e. Cab Card Data); [1]Permit Data; Electronic Screening Enrollment; Vehicle Check Flags: (e.g., Registration Check Flag)
Driver (Future)	[1]Driver Unique ID; [1]Home State; Names; Address; DOB, Sex; Citizenship	Last Inspection Overview; Accident Summary; Inspection & Violation Summaries; [1]Last OOS	Driver Check Flags (e.g., DMV Check Flag)

Figure 3–1. Snapshot Data Stored in SAFER/CVIEW

3.4 Standards

3.4.1 DSRC Standards

The following subsections briefly describe the status of the current DSRC standards and specifications applicable to electronic screening. The current recommended policy from United States Department of Transportation (USDOT) (Reference 2), regarding DSRC for electronic screening, is as follows:

1. For the immediate future, all Commercial Vehicle Operations (CVO) and Border Crossing projects will continue to utilize the current DSRC configuration employed by the programs. This is the American Society for Testing and Materials (ASTM) E17.51 version 6 (v6) active tag.
2. Beginning January 1, 2001, all CVO and Border Crossing projects will use an active configuration that is backward compatible with the current configuration and yet consists of the following:
   A. "ASTM version 6" defines the data link layer.
   B. The Institute of Electrical and Electronics Engineers (IEEE) 1455-1999 application layer standard and the ASTM Provisional Standard (PS) 111-98, Layer 1 active physical layer standard will be implemented.

3.4.1.1 ASTM E17.51 Version 6

Although never approved as a formal standard, ASTM E17.51 v6 (Reference 3) defines the DSRC equipment currently used in all US electronic screening projects. USDOT has stated that for the immediate future, all CVO and International Border Crossing (IBC) deployments should continue to use DSRC equipment complying with ASTM E17.51 v6. Raytheon (formerly Hughes Aircraft) and Mark IV Industries are the two hardware vendors for these products.

3.4.1.2 ASTM PS 111-98

In 1996, ASTM and IEEE, with support from USDOT, began development of a new set of formal DSRC standards for North America. ASTM completed development of the E17.51 version 7 (v7) draft standards for Layer 1, Physical layer, and Layer 2, Data Link layer, in late 1998.

The Physical layer, Layer 1, defines the RF characteristics of the communications link. The ASTM E17.51 v7 Layer 1 document was approved as provisional standard PS 111-98 (Reference 4).

The Data-Link layer, Layer 2, defines the protocol for transmission and reception of information over the radio link. The Layer 2 document was not accepted by ballot, and no further activity is planned for this Version 7 of the standard. The DSRC vendors have also stated that there are no plans to develop products based on ASTM E17.51 v7 Layer 2.

3.4.1.3 IEEE 1455

The IEEE 1455 standard defines the data message formats and how DSRC applications, such as electronic screening and Electronic Toll Collection (ETC), interface with the readers and transponders. This standard has been designed to accommodate multiple DSRC applications with a single transponder. The IEEE P1455 document was approved as a standard in 1999 (Reference 5).

3.4.1.4 Sandwich Specification

DSRC hardware vendors are unwilling to expend the necessary research and development funds to build new products based on ASTM PS 111-98 Layer 1, ASTM E17.51 v7 Layer 2, and IEEE 1455. The primary issue is that the potential market for the new products does not justify the additional development risk and expense, particularly to implement a new data link layer.

USDOT has proposed that the current vendors for DSRC equipment used in CVO, Mark IV and Raytheon, attempt to specify a product configuration, based on existing technology, which implements features of the new standards. This active "sandwich" protocol would consist of the existing data link layer, ASTM E17.51 v6 Layer 2, along with the new ASTM 111-98 Layer 1 and IEEE 1455 standards. JHU/APL is currently working with Mark IV and Raytheon to define this sandwich specification.

3.4.2 EDI Standards

Use of ANSI ASC X12 EDI transaction sets is part of the CVISN architecture. The following transaction sets are used in electronic screening:

- TS 285 CV Safety & Credentials Information Exchange (snapshots)
- TS 824 Application Advice
- TS 997 Functional Acknowledgement

TS 285 is used to request and transmit snapshot data. Specifically, TS 285 is used to transmit carrier and vehicle snapshots or snapshot segment updates between SAFER and the state credential system. TS 824 is used report the results of processing a 285 transaction. TS 997 is used to functionally acknowledge that a transaction is received, and to report syntax problems. See Reference 6, 7, and 8 for more information about the ANSI ASC X12 EDI standards.