INTRODUCTION TO ITS/CVO

PARTICIPANT MANUAL
COURSE 1

NOTE TO READER:

THIS IS A LARGE DOCUMENT

Due to its large size, this document has been segmented into multiple files. All files separate from this main document file are accessible from links (blue type) in the table of contents or the body of the document.

Introduction to ITS/CVO (Intelligent Transportation Systems/ Commercial Vehicle Operations)

Photo Courtesy of Hunter Engineering Company

Photo Courtesy of Hunter Engineering Company

Prepared for:

U.S. Department of Transportation
Office of Motor Carriers - ITS/CVO

Version 2.2, August 1999

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Introduction to ITS/CVO
Participant Manual

Version 2.2
August 1999

Miscellaneous:

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Introduction to ITS/CVO (Intelligent Transportation Systems/ Commercial Vehicle Operations)

Photo Courtesy of Hunter Engineering Company

Photo Courtesy of Hunter Engineering Company

MODULE 0

Course Introduction

Course Purpose

Develop an Awareness Level Knowledge

- The primary purpose of this course is to provide a general overview and body of knowledge about the ITS/CVO program, its parts, purpose, background, and current status.

Housekeeping

- ✓ Time Period (daily start/stop times)
- ✓ Breaks/Lunch
- ✓ Restrooms
- ✓ Smoking Policy
- ✓ Emergency/Evacuation Policy
- ✓ Introductions

Housekeeping (cont.)

Time Period:

Course Duration: One day (approximately 8 hours)

Daily Start / Stop Times: _____

Breaks/Lunch:

Breaks will be provided as appropriate.

One hour will be given for lunch at: _____

Restrooms:

Restrooms are located at/in: _____

Smoking Policy:

A **no smoking** policy is in effect.

Emergency/Evacuation Policy:

Information and directions_____

Introductions:

Please be very brief when introducing yourself. State your name, job position and function, and very briefly, your past experience with ITS/CVO, if any.

Housekeeping (cont.)

- ✓ Expectations/Experience
- ✓ Course Evaluations
- ✓ Course Materials
- ✓ Lesson Learning Objectives
- ✓ Activities
- ✓ Case Study

Housekeeping (cont.)

Expectations/Experience:

- Do you have any specific expectations about this course?
- Do you have any concerns or issues with ITS/CVO?
- Is there anything in particular that you need to take away from this course?

Course Evaluations:

The course evaluation form will be provided by the instructor. The evaluation forms will be collected before you leave.

Course Materials:

Participant Manual: Contains all of the material we will be discussing in this course. Other references are also contained in your manuals for later use. Any exercise worksheets or forms are included or will be provided as needed. You have copies of all overhead slides for your use, should you provide briefings and/or training to others. The participant manual is meant to be an interactive tool and to provide you with valuable reference material. Take notes as needed.

Housekeeping (cont.)

- ✓ Expectations/Experience
- ✓ Course Evaluations
- ✓ Course Materials
- ✓ Lesson Learning Objectives
- ✓ Activities
- ✓ Case Study

Housekeeping (cont.)

Lesson Learning Objectives:

Each module will have specific learning objectives which will be stated at the beginning of the instruction. The material in the course is designed to achieve each of these objectives. These objectives were derived from an analysis of learning needs conducted with ITS/CVO stakeholders from around the country.

Activities:

Many different types of learning activities are used in this course. Your participation will make the learning more effective and enjoyable. Relax and enjoy yourself!

Case Study:

A Case Study has been developed to help clarify many of the concepts you will learn. During case study work, consider how the information will affect your own state and participate fully.

Course Agenda

DAY 1

0 Course Introduction (45 minutes)

1 Introduction / Background of ITS/CVO (45 min)

2 Case Study (60 min)

ITS/CVO Program Areas

3 Safety Assurance (85 min)

4 Credentials Administration (85 min)

5 Electronic Screening (70 min)

DAY 2

6 Carrier Operations (30 min)

ITS/CVO Initiatives

7 CVISN (45 min)

8 Mainstreaming and Next Steps (40 min)

9 Wrap-Up (20 min)

Recap & Questions

Module Objectives:

- Purpose and scope of the course
- Course Agenda
- Housekeeping

Any Questions?

Notes

Photo Courtesy of Hunter Engineering Company

Photo Courtesy of Fleet Owner Magazine

Photo Courtesy of Hicklin Engineering Company

MODULE 1

Introduction & Background

Learning Objectives

Participants will be able to:

- **DESCRIBE** the background of ITS/CVO, including the vision, objectives, and organization.
- **DEFINE** ITS/CVO terms.
- **IDENTIFY** three benefits ITS/CVO could bring to the participant's own jurisdiction.
- **IDENTIFY** issues and opportunities in the deployment of ITS/CVO.
- **DESCRIBE** major ITS/CVO schedules and milestones.

Notes

Background

- **ISTEA (Intermodal Surface Transportation Efficiency Act) 1991**
  - **Funding for 1991 through 1997**
  - **Some funding for ITS/CVO initiatives**
- **Focus on advanced technologies**
- **Now TEA 21 (strong on ITS/CVO through 2003)**

However

Don’t automate a bad process!

Background

Legislative

- ISTEA (Intermodal Surface Transportation Efficiency Act) passed by Congress in 1991 calls for the creation of an economically efficient and environmentally sound transportation system that will move people and goods in an energy efficient manner, and will provide the foundation for a competitive American transportation industry.

Focus

- Focus on research and development of advanced technologies such as information processing, communications, control, and electronics to improve our transportation system.

New Way of Thinking

- Stakeholders (Federal, State, and Local governments as well as private sector businesses) may re-engineer business processes. Stakeholders should analyze current business processes and make appropriate statutory, procedural, and organizational changes in order to maximize benefits of new technologies.

ITS & CVO

ITS Technologies

- Information processing
- Communications
- Sensors
- Electronics

ITS/CVO Program Areas

- Safety assurance
- Credentials administration
- Electronic screening
- Carrier operations

Commercial Vehicle Operations

- Safety enforcement
- Administration
- Fleet & vehicle management

Definitions

Intelligent Transportation Systems (ITS)

ITS integrate advanced computer information processing, communications, sensor, and electronics technologies and management strategies to increase the safety and efficiency of the surface transportation system, including:

- Collect and transmit information on traffic conditions and transit schedules for travelers before and during their trips. Alerted to hazards and delays, travelers can change their plans to minimize inconvenience and additional strain on the system.
- Decrease congestion by reducing the number of traffic incidents, clearing them more quickly when they occur, rerouting traffic flow around them, and automatically collecting tolls.
- Improve the productivity of commercial, transit, and public safety fleets by using a global positioning system, computer-aided dispatch, and weigh-in-motion systems that speed vehicles through much of the red tape associated with interstate commerce.
- Assist drivers in reaching a desired destination with navigation systems enhanced with pathfinding, or route guidance.

ITS & CVO

ITS Technologies

- Information processing
- Communications
- Sensors
- Electronics

ITS/CVO Program Areas

- Safety assurance
- Credentials administration
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- Carrier operations

Commercial Vehicle Operations

- Safety enforcement
- Administration
- Fleet & vehicle management

Definitions (cont.)

Commercial Vehicle Operations (CVO)

CVO include all the operations associated with moving goods and passengers via commercial vehicles over the North American highway system and the activities necessary to regulate the operations.

Operations involve dozens of areas of interaction between public agencies and motor carriers. The interactions are critical for highway safety, carrier productivity, and revenue collection. Some of the critical functions and activities include:

- Commercial vehicle credentials administration (registration, fuel tax, operating authority, etc.)
- Roadside safety enforcement
- Size and weight enforcement
- Vehicle safety inspection and maintenance
- Fleet routing, dispatching, etc.
- Cargo handling and tracking

Photo Courtesy of Hunter Engineering Company

ITS & CVO

ITS Technologies

- Information processing
- Communications
- Sensors
- Electronics

ITS/CVO Program Areas

- Safety assurance
- Credentials administration
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Commercial Vehicle Operations

- Safety enforcement
- Administration
- Fleet & vehicle management

Definitions (cont.)

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

The ITS/CVO program is a voluntary effort involving public and private partnerships focused on improving highway safety and motor carrier productivity through the use of technology. The Federal Highway Administration (FHWA) is the lead Federal agency for the program and OMC's ITS/CVO Division is directly responsible for oversight of the program.

The applications address four program areas:

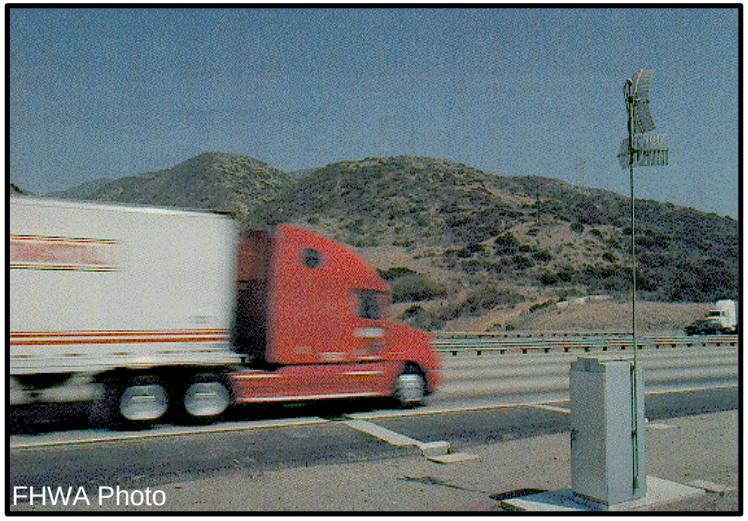
- Safety assurance
- Credentials administration
- Electronic screening
- Carrier operations

ITS/CVO Vision

Assisted by technology,

trucks and buses will move safely

and freely throughout North America



ITS/CVO Mission

To achieve the Vision by using cost-effective methods and technologies to streamline state regulatory, enforcement, and motor carrier practices, while increasing levels of safety and productivity for both states and carriers, thus improving highway safety for all.

ITS/CVO Goals

- Improve Highway Safety
- Simplify Operations
- Save Lives, Time and Money

ITS/CVO Goals

Improve Highway Safety

- more timely and accurate data
- reduce frequency & severity of commercial vehicle crashes
- concentrate roadside safety inspections on high-risk carriers, drivers and vehicles
- on-board systems monitor mechanical systems and, in the future, driver alertness, warning them of unstable conditions

Simplify Operations

- ITS/CVO simplifies operations and makes the job easier by using available technologies
- reduces paperwork
- means less bureaucracy
- quicker roadside inspections
- streamlines information-based activities
- easier license and permit purchasing

Save Lives, Time and Money

- safe, legal carriers save time, fuel, and maintenance costs
- improved efficiency at weigh stations and international border crossings
- improved economic competitiveness by reducing the cost of motor carrier transportation and regulation

ITS/CVO Program Areas: Safety Assurance and Credentials Administration

Program Areas

Safety Assurance	Credentials Administration		
• Access to driver, vehicle, and carrier information on inspections and accidents • Automated inspections and reviews • Onboard safety monitoring	• Electronic credentialing • Clearinghouses • Interagency data exchange • Interstate data exchange		

ITS/CVO Program Areas: Safety Assurance and Credentials Administration

Safety Assurance

Programs and services designed to assure the safety of commercial drivers, vehicles, and cargo. These include:

- access to driver, vehicle, and carrier information on inspections and accidents
- automated inspections and reviews
- on-board safety monitoring (Intelligent Vehicle Initiative)

Credentials Administration

Programs and services designed to improve the deskside procedures and systems for managing motor carrier regulation. These include:

- electronic application, purchasing, and issuance of credentials
- automated tax reporting and filing
- interagency data exchange
- interstate data exchange

ITS/CVO Program Areas: Electronic Screening and Carrier Operations

Program Areas

Safety Assurance	Credentials Administration	Electronic Screening	Carrier Operations
		• Automated weight and credentials screening • International electronic border clearance	• Fleet and vehicle management • Traveler information systems • Hazardous Materials incident response

ITS/CVO Program Areas: Electronic Screening and Carrier Operations

Electronic Screening

Programs and services designed to facilitate the verification of size, weight, and credential information, including:

- automated screening and clearance of commercial vehicles
- international electronic border clearance

Carrier Operations

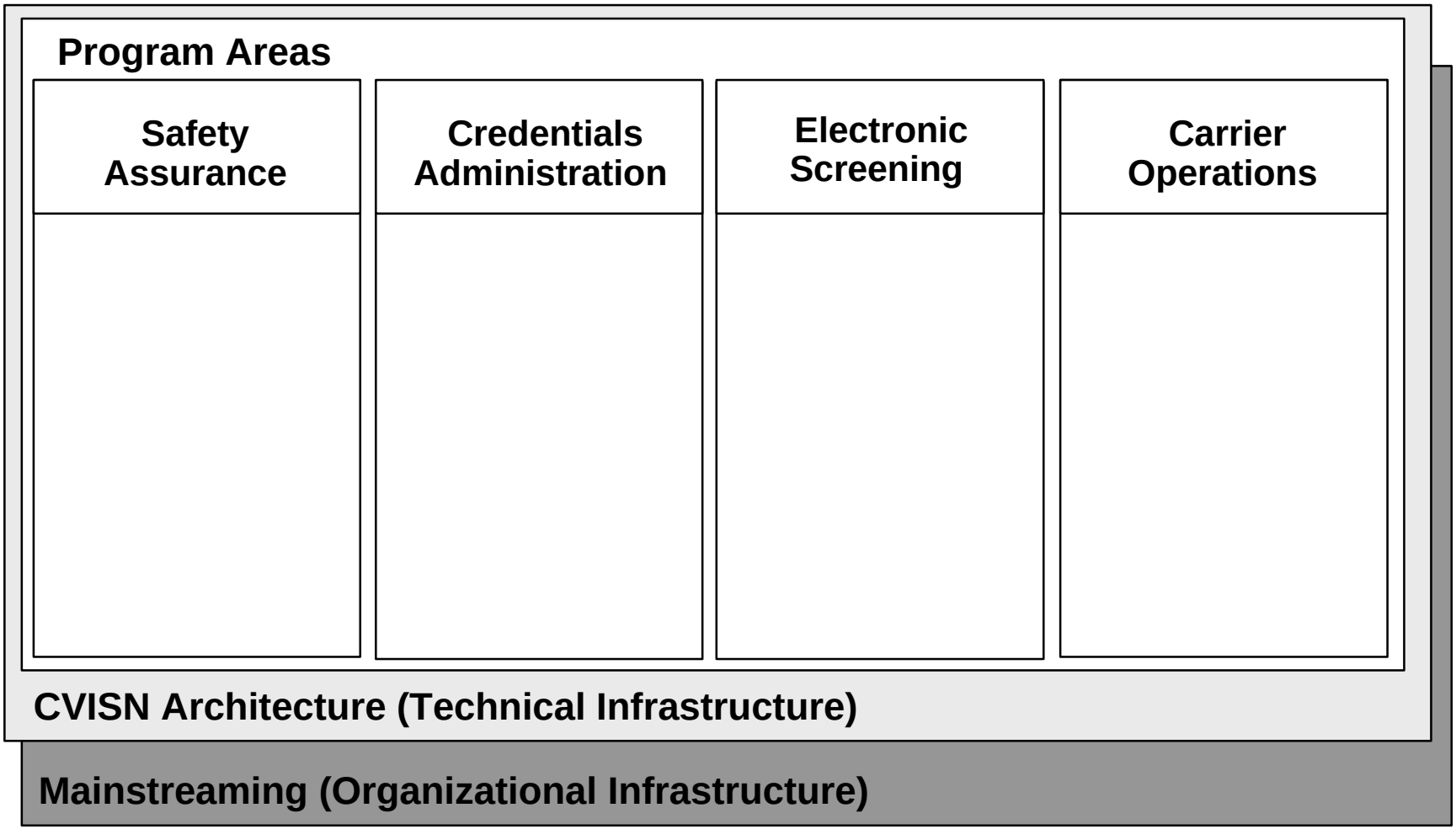
Public Sector: programs and services designed to help manage the flow of commercial vehicles, including:

- travel information services
- hazardous material incident response services
- States are involved to varying degrees with travel advisory information systems

Private Sector: taking the lead in the deployment of fleet and vehicle management technology to improve motor carrier productivity, including:

- global positioning systems (GPS)
- satellite technology integrated with computer-aided dispatch
- engine diagnostic systems

ITS/CVO Key Initiatives



ITS/CVO Key Initiatives

1) CVISN Architecture (Technical Infrastructure)

Commercial Vehicle Information Systems & Networks (CVISN) is a collection of information systems and communications networks that provide support to CVO. CVISN includes information systems owned and operated by governments, carriers, and other stakeholders.

2) Mainstreaming and Next Steps (Organizational Infrastructure)

The ***Mainstreaming and Next Steps*** initiative is intended to organize and manage ITS/CVO deployment and communicate the ITS/CVO program to all stakeholders to gain support and participation. These efforts are underway in 40 states.

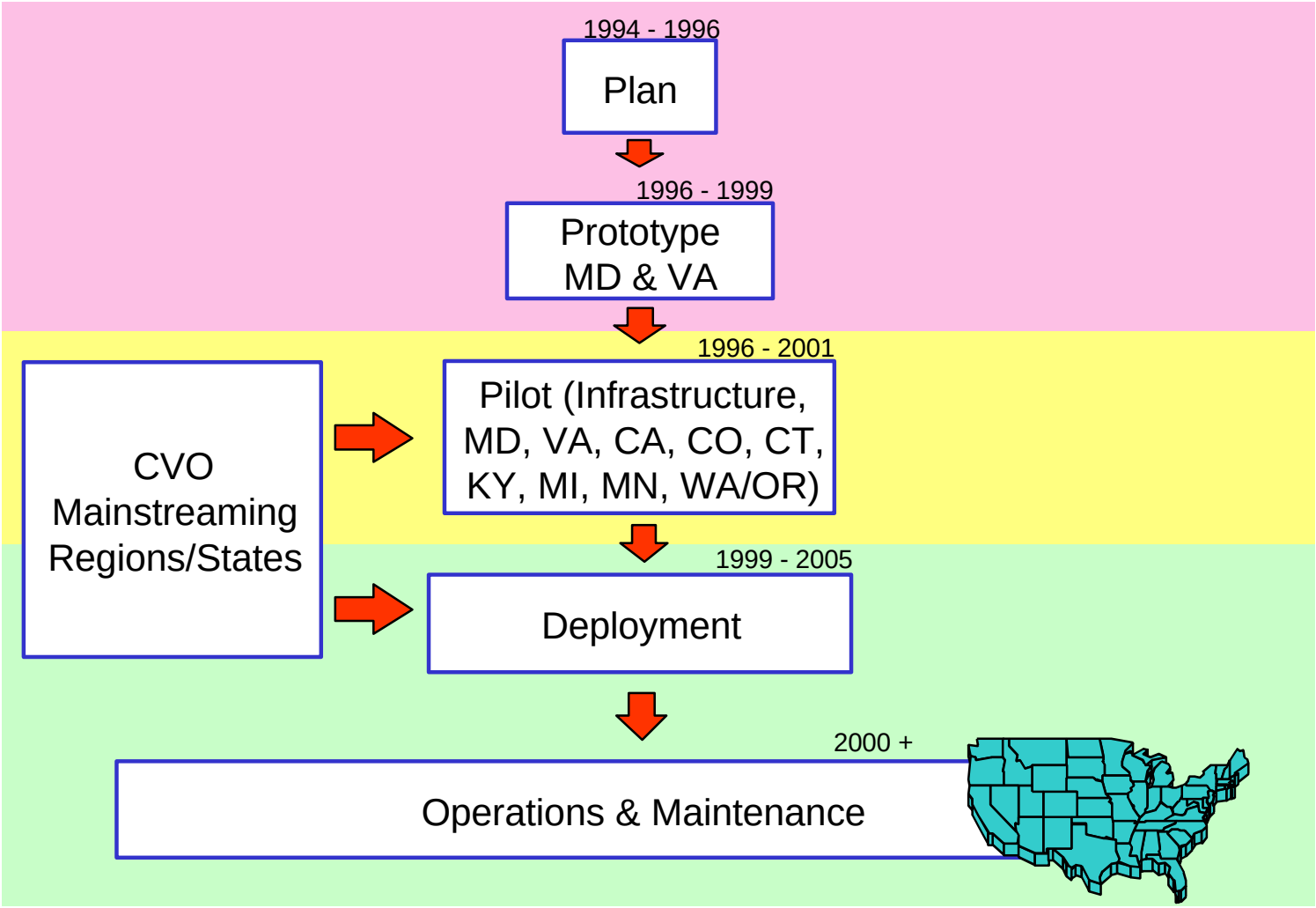
What’s going on in your state right now in ITS/CVO that’s really good?

(What’s working really well?)

What’s going on in your state that you feel the most unsure about?

(What are you not convinced is working or will work?)

CVISN Nationwide Deployment Strategy



Phased Deployment Strategy

PLAN 1994 - 1996

ITS/CVO Activities Overview & Roadmap

PROTOTYPE (MD & VA) 1996 - 1999

Technology and operational demonstration to illustrate and refine concepts

PILOT 1996 - 2001

(Infrastructure, MD, VA, and eight states from seven regions)

- Model deployment of EDI
- Clearinghouses
- SAFER
- State systems compliant with CVISN architecture

DEPLOYMENT 1999-2005

Mainstreaming and Next Steps (all interested states)

OPERATIONS AND MAINTENANCE 2000 +

(All deployment states)

Key Points to Remember

- **ITS/CVO**
  - Program Areas
    - Safety Assurance
    - Electronic Credentialing
    - Electronic Screening
    - Carrier Operations
  - CVISN
  - Mainstreaming
- **Goals**
  - Improve Highway Safety
  - Simplify Operations
  - Save Lives, Time and Money
- **Approach**
  - Plan
  - Pilot
  - Maintain
  - Prototype
  - Deploy
- **Federal Funding Source**
  - ISTEA/TEA21

Recap & Questions

Module Objectives:

- DESCRIBE the background of ITS/CVO, including the vision, objectives, and organization
- DEFINE ITS/CVO terms.
- IDENTIFY three benefits ITS/CVO technologies and applications could bring to the participant's own jurisdiction.
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- IDENTIFY major ITS/CVO schedules and milestones.

Any Questions?

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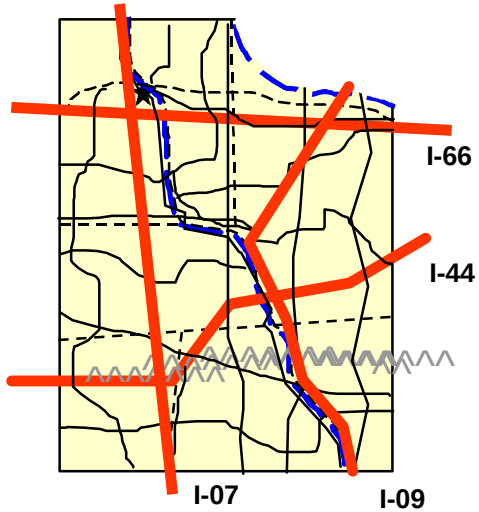


MODULE 2
Midland - Our Sample State

Learning Objectives

Participants will be able to:

- **Describe** the characteristics of the State of Midland
- **Describe** Midland's CVO-related issues
- **Compare** the characteristics of Midland with their own state
- **State** the four ITS/CVO program areas

Module Structure

- General information about Midland
- CVO in Midland
- CVO issues in Midland
- Exercise/Discussion
- Recap

Why Use a Case Study?

- Diverse audience
- Provides common reference point
- Provides a means to illustrate ITS/CVO applications to solve common CVO-related issues
- Utilized throughout remaining modules

Why Use a Case Study?

Diverse audience

- Participants represent a variety of backgrounds and are likely to include representatives from Federal, State, or Local agencies as well as from private industry.

Provides common reference point

- Since the benefits of ITS/CVO are primarily directed toward State agencies and motor carriers, a case study involving a fictitious state was chosen. Participants representing Federal agencies are asked to place themselves in a facilitating role (change agent, promoter, manager, etc.) to the 2 primary customers of ITS/CVO products and services: The States and the motor carriers.

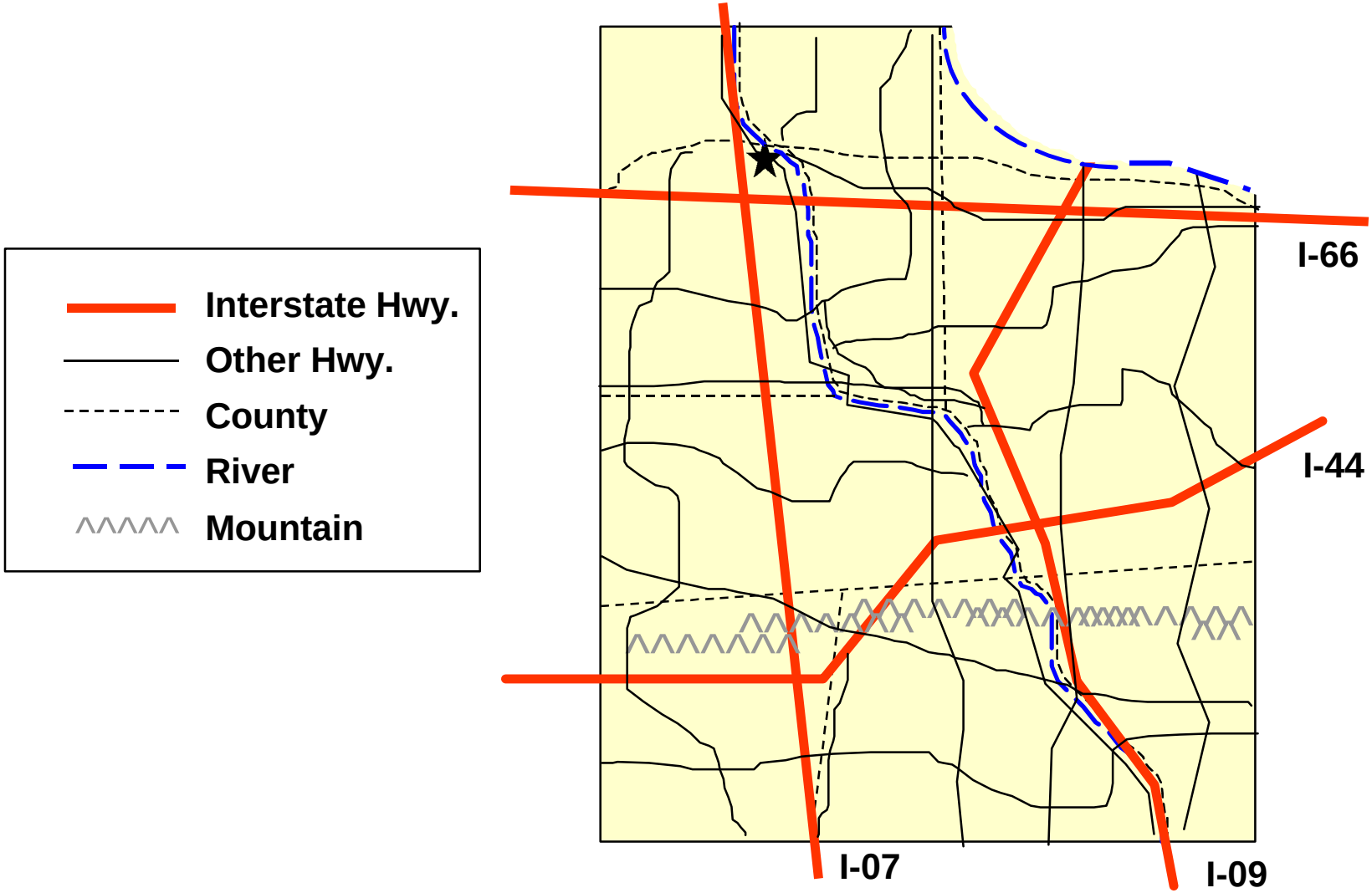
Provides a means to illustrate ITS/CVO applications to solve common CVO-related issues

- Case studies provide concrete examples to illustrate potential solutions to common problems. They help ensure that participants think about issues and solutions in a structured manner.

Utilized throughout remaining modules

- The Midland case study will be re-visited throughout the remaining modules which will again, provide a structured means of applying ITS/CVO solutions to common CVO-related issues.

The State of Midland: General Information



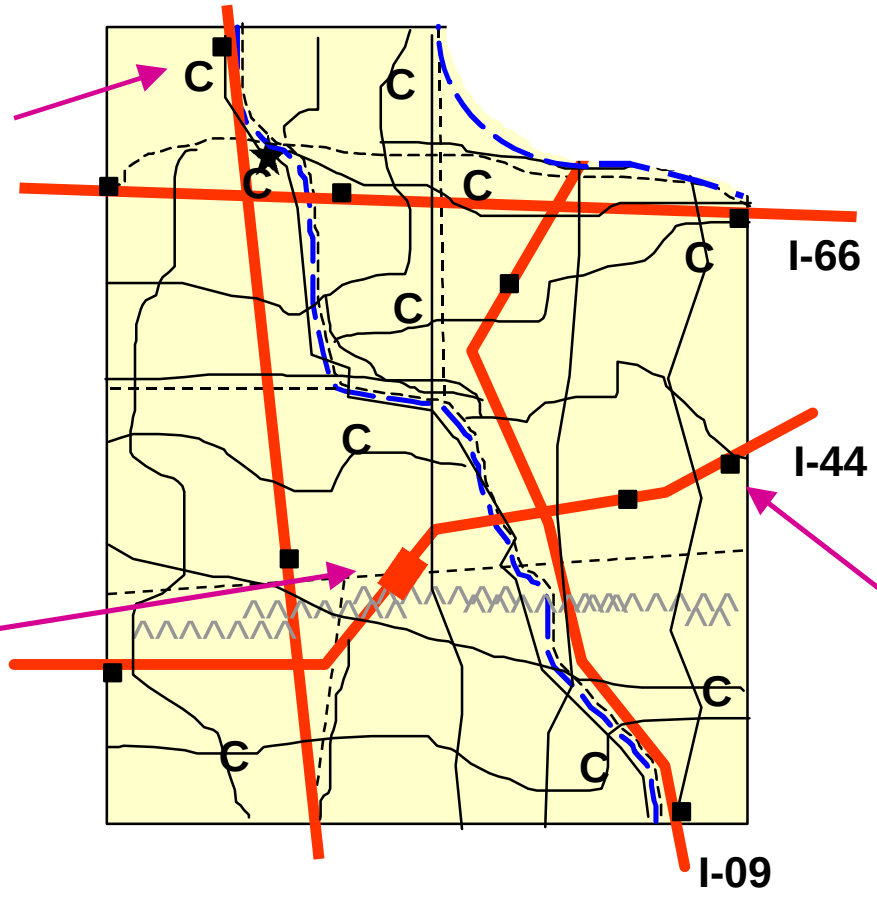
The State of Midland: General Information

- **Capital:** Midburg
- **Population:** ~ 8 million
- **Topography:** Gray Mountains spine runs across the state, West to East; otherwise, generally rolling plain. The Muddy River (runs NW to SE) and the Clear River (runs West to East across top of the state; part of this river forms state boundary). Rivers are navigable to large boat traffic.
- **Climate:** Variable, with wide fluctuations in seasonal temperatures
- **Principle Industries:** Manufacturing, food & agriculture
- **Counties:** 10
- **Total area:** ~ 45,000 sq. miles

Commercial Vehicle Operations in Midland Today

Credentialing facilities (C) in each county

20% of all Commercial Vehicle crashes occur on one 20 mile stretch, known as "Scrunch Alley"



12 fixed inspection and weigh stations

Commercial Vehicle Operations in Midland Today

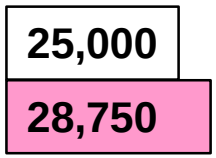
- Truck vehicle miles traveled (VMT) in 1994 ~ 6 billion
- No electronic screening capabilities
- Fixed inspection sites also weigh vehicles
- All credentials required for commercial vehicle operations must be applied for in person at the county-based credentialing facilities
- 1994 safety enforcement:

  ~420 on-site (compliance & educational/safety) reviews in 1994;

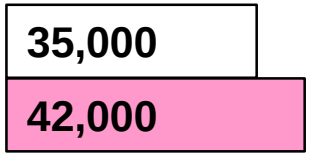
  ~59,000 inspections
- As part of a state-wide information technology initiative, state CV administrative systems and networks are being upgraded to exchange more information electronically
- Most agencies have already computerized their operations to some extent due to the initiative
- Inspection offices have radio communications to check on current status and past performance records

Growth in Midland

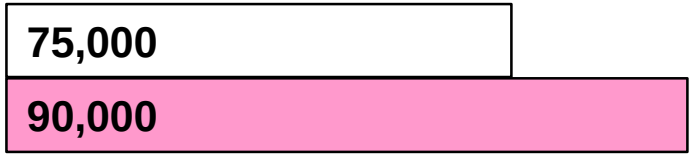
Interstate Commercial Vehicles based in Midland



Intrastate CVs based in Midland



CV Drivers licensed in Midland



Injury/Fatal Accidents per year involving large trucks

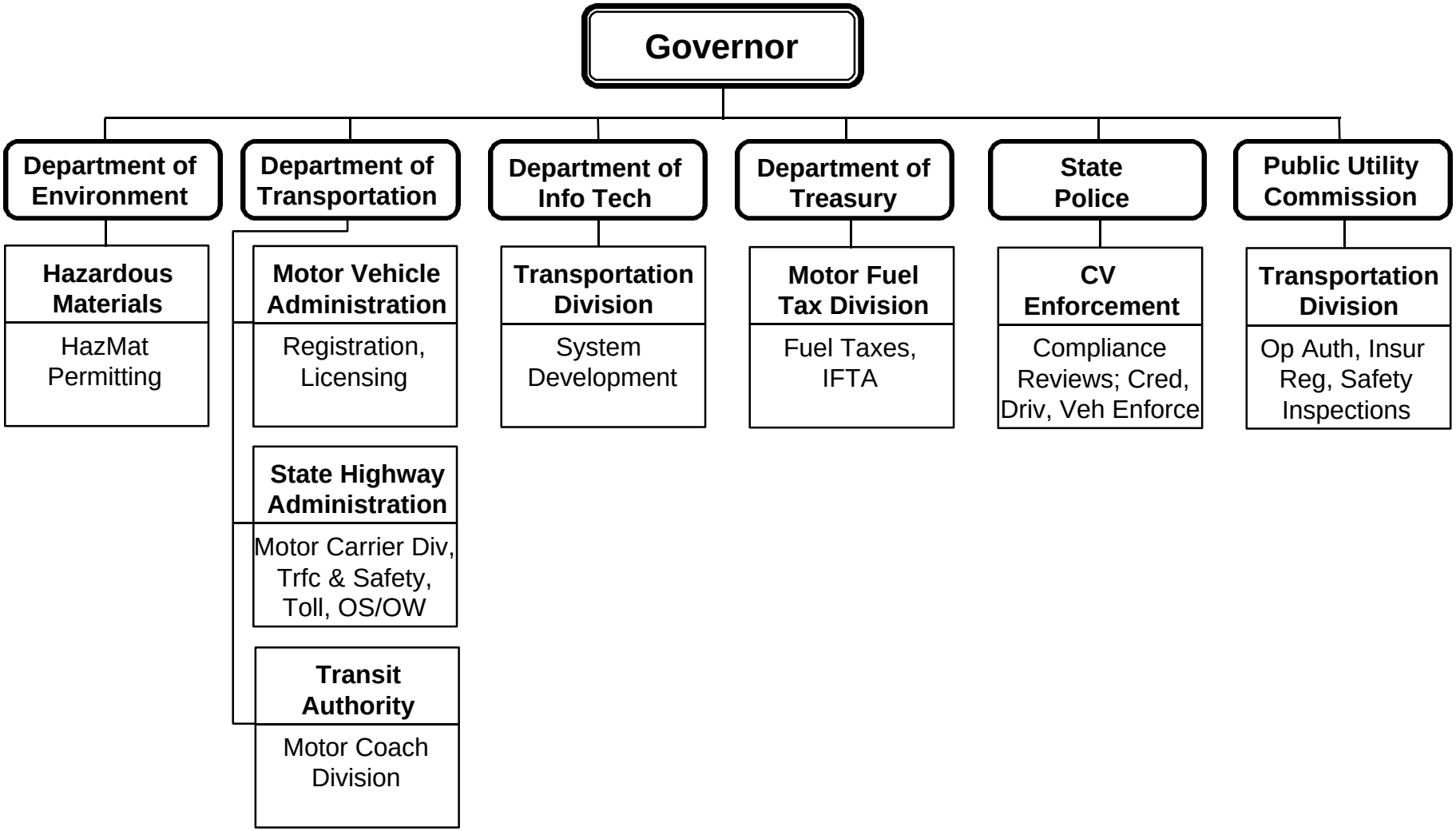
Growth in Midland

- Midland's economic growth comes from its two main industries: Manufacturing and agriculture/food.

- For example, widgets for communication systems are made at plants in the northern part of the state and shipped south to communication systems manufacturers.

- Dairy and soybean farms in southwestern Midland ship goods throughout the state and across state lines to neighbors to the north and east.

State Agencies and Organizational Issues



State Agencies and Organizational Issues

- Some agencies have a history of working well together (State Police and Public Utility Commission (PUC); Department of Environment and DOT).
- Other agencies have little experience in working together (all other combinations).
- Recent Reductions-in-Force have left many agencies short-handed.
- State Police perform compliance reviews, and enforce credentials, driver and vehicle regulations on the roadways.
- The PUC's Transportation Division is responsible for safety inspections (driver and vehicle).
- Different agencies and administrations within agencies are involved with credentialing, as shown.

Midland’s CVO-Related Issues

- Safety Assurance
- Credentials Administration
- Electronic Screening
- Carrier Operations

Midland's CVO-Related Issues

Safety Assurance

- CV safety performance
- Access to safety performance data
- Regulatory compliance
- Inspections

Credentials Administration

- Credentialing for commercial and motor coach carriers, vehicles, and drivers
- Supporting base state agreements
- Tax filing related to CV credentials

Electronic Screening

- Safety, weight, and credentials enforcement

Carrier Operations

- Fleet administration, maintenance, & management
- Credentialing & tax reporting
- Freight administration & management
- HazMat

Midland's Safety Assurance Issues

- Truck traffic and the number of carriers in operation has increased significantly since deregulation. Midland's Patrol officers can no longer rely on personal knowledge as the primary "database" for targeting inspections.

- Midland is ranked 11th in the nation with 3.5% of the fatal large truck crashes

- Crash patterns in high accident locations match the national averages

- ASPEN is used by 50% of the inspectors; want to expand

Midland’s Safety Assurance Issues

Inspection Selection

Most of Midland’s inspections are conducted on a random basis, but officers also rely on their personal knowledge of carriers’ past performance in making inspection selection decisions.

With deregulation, the number of carriers running in Midland has increased significantly. With deregulation, the number of carriers running in Midland has increased significantly., and many of these new carriers are unfamiliar to Midland’s officers. Midland believes that its scarce inspection resources could be maximized with roadside access to carrier safety ratings, accident and inspection histories.

ASPEN

An inspection support system used on a portable computer, makes inspection reporting faster, and most inspectors want it.

High Accident Locations

The crash statistics are similar to those experienced nation-wide.

- Daylight, weather fair, commercial vehicle (CV) driver not at fault (60%)
- Poor lighting, poor road condition (23%)
- Drowsy CV driver (5%)
- Other (12%)

But since so many crashes occur in several limited locations, Midland hopes to be able to focus efforts here to significantly improve the state-wide crash figures.

Midland's Credentials Administration Issues

- Increased demand for services in the face of static state budgets results in delays to the carrier when applying for credentials
- The error / return rate for applications is over 15%, resulting in additional delays
- Agencies have no way to verify payments for apportioned credentials from other states except for random spot checks
- Roadside cannot access credential databases, resulting in infrequent verification of paper credentials

Midland's Credentials Administration Issues

CV Credentials in Midland include:

- Vehicle registration [interstate registration plan (IRP) or intrastate], title, oversize/overweight permit
- Carrier registration (including insurance verification and hazardous materials authority), interstate fuel tax (IFTA), HazMat permit
- Driver licensing

The typical process for credentialing today is:

1. Applicant requests paper form from state via phone; or state mails renewal form to applicant
2. Applicant fills in entire form and submits in person at the appropriate county-based credential facility
3. State personnel review the form in real time and ask applicant for supporting documentation, corrections, and clarification, and compute fees due.
4. Applicant pays fee via check, cash, or credit card.
5. In some cases, applicant departs with credentials (driver's license, temporary license plate, oversize/overweight permit, HazMat permit). In other cases, applicant departs with receipt, but no credential, pending further processing and checks.
6. Application information is entered into computer system in the appropriate credential office. The information is uploaded to a central site for that credential administration, and checked to see if the credential should be granted. Some checks are automated, some are manual. In most cases, the entry-check-response process takes ~ 5 working days.
7. If the application is approved, in most cases, credentials are printed and mailed once a week. If the application isn't approved, the applicant is contacted either by phone or mail, depending on the nature of the problem.

Midland's Credentials Administration Issues (cont.)

- The State is encouraging more carriers and vehicles to be based in Midland.

- The personnel budget for commercial vehicle credentials administration is flat.

Midland's Credentials Administration Issues (cont.)

- To spur new economic development, and continue the upward trends that already exist, Midland has enacted legislation that offers tax breaks to various forms of business, including shippers and carriers.

- The state budget allows for expenditures to continue the enhancement of network and computer systems, but does not allow for adding permanent staff to the administrative offices.

- Midland was among the first states to participate in the IRP (International Registration Plan) and IFTA (International Fuel Tax Agreement) base state agreements. Under these agreements, fees are collected in a single state for registration and fuel taxes, respectively. The base state pays the other states in which the vehicle (IRP) or carrier (IFTA) operates. The existing IRP and IFTA staff are struggling to keep up with the manual process of state-to-state reconciliation.

Midland's Commercial Vehicle Screening Issues

- Heavy traffic sometimes closes a few existing weigh stations
- Vehicles are increasingly using bypass routes to avoid weigh stations

Midland's Commercial Vehicle Screening Issues

- Inspections occur at all fixed CV check sites. At least one CV check site on each interstate highway also weighs vehicles using static scales.
- The weigh stations have been maintained well, but not upgraded to take advantage of technology.
- The stations closest to the agriculture and manufacturing industries are often swamped with vehicles and must close temporarily to avoid creating roadway hazards.
- The number of OS/OW permits issued has skyrocketed as existing carriers struggle to keep up with the increased demands of those with goods to move.
- Midland's neighbors are trying to improve their roadside operations by using roadside readers and vehicle-mounted transponders to identify approaching vehicles, weigh-in-motion and automatic vehicle classification to measure critical vehicle characteristics while in motion, and quick look-ups of safety history data and credentials information available from on-line information systems to decide which vehicles to pull in and focus on.
- Midland's neighbors have offered to help Midland get started in their program. The state legislature has earmarked funds to start electronic screening in Midland.

Midland's Carrier Operations Issues

- The use of technology among carriers based in Midland varies widely
- Many new carriers are coming to Midland
- Just-in-time delivery is an important facet of Midland's carrier business

Photo Courtesy of Fleet Owners Magazine

Midland's Carrier Operations Issues

- Midland's carriers range from those owner/operators who have one vehicle and no computers, to those interstate operators who have hundreds of vehicles with a computer and navigation equipment in each one, and information technology systems departments.

- With its emphasis on customer service, Midland wants to accommodate each kind of carrier with service tailored to their needs.

- Just-in-time delivery requires up-to-the-minute knowledge of vehicle location, robust dispatch control, and knowledge of traffic and roadway conditions.

Midland's Projected CVO Improvements

Broad Goals:

- Improve highway safety
- Streamline credentials and tax administration
- Reduce congestion costs for motor carriers
- Ensure regulatory compliance and equitable treatment

Stakeholders Cite These As Keys to Achieving the Goals:

- Revised regulatory environment & re-engineered business practices

- Technology

Notes

Exercise/Discussion:

HOW DOES MIDLAND COMPARE TO YOUR STATE?

Issue Area	Comparison to Own State	
	Similarities	Differences
Safety Assurance *(See Page 2-16)*		
Credentials Admin. *(See Page 2-18)*		
Screening *(See Page 2-22)*		
Carrier Ops *(See Page 2-24)*		

Recap of Midland's Issues

- **Safety Assurance**
  - Targeted inspection selection
  - 11th in fatal large truck crashes
  - High accident locations
  - Expand use of ASPEN
- **Credentials Administration**
  - Delays
  - High return rate
  - Cash management
  - Data to roadside
- **Commercial Vehicle Screening**
  - Heavy traffic sometimes closes a few weigh stations
  - More commercial vehicles using bypass routes
- **Carrier Operations**
  - Wide variety among carriers regarding use of technology
  - Many new carriers
  - Just-in-time deliveries

ITS/CVO Program Areas

Program areas bear a remarkable resemblance to Midland's "issue areas"

- Safety Assurance & Safety Information Exchange
- Credentials Administration
- Electronic Screening
- Carrier Operations

ITS/CVO Program Areas

Safety Assurance & Safety Information Exchange

Improve highway safety by focusing enforcement resources on high-risk carriers, drivers, and vehicles

- Improve deskside and roadside access to safety information
- Improve safety inspection and review processes
- Enhance driver's ability to monitor the enroute safety status of the vehicle and driver

Credentials Administration

Streamline credentials and tax administration

- Enable electronic credentialing and tax filing
- Enhance interagency and interstate data and funds exchange
- Provide credentials information to authorized officials

Electronic Screening

Improve the screening by roadside enforcement operations

- Focus on carriers, drivers, and vehicles operating unsafely or illegally
- Reduce the frequency and duration of stops for safe and legal carriers
- Enable increased use of mobile or remote enforcement

Carrier Operations

- Public sector improvements to travel information and hazardous material response services
- Private sector improvements involving global positioning systems, use of satellite technology integrated with computer-aided dispatch, and engine diagnostic systems

Recap & Questions

Module Objectives:

- Describe the characteristics of the State of Midland
- Describe Midland's CVO-related issues
- Compare the characteristics of Midland with their own state
- State the four ITS/CVO program areas

Any Questions?

Photo Courtesy of B & G Technologies

Photo Courtesy of Hunter Engineering Company

Photo Courtesy of Hicklin Engineering Company

MODULE 3

ITS/CVO Program Areas: Safety Assurance

US Dept of Transportation

Safety Assurance

Program Areas

Safety Assurance	Credentials Administration	Electronic Screening	Carrier Operations
• Access to driver, vehicle, and carrier information on inspections and accidents • Automated inspections and reviews • Onboard safety monitoring	• Electronic credentialing • Clearinghouses • Interagency data exchange • Interstate data exchange	• Automated weight and credentials screening • International electronic border clearance	• Fleet and vehicle management • Traveler information systems • Hazardous Materials incident response

CVISN Architecture (Technical Infrastructure)

Mainstreaming and Deployment Planning (Organizational Infrastructure)

Learning Objectives

Participants will be able to:

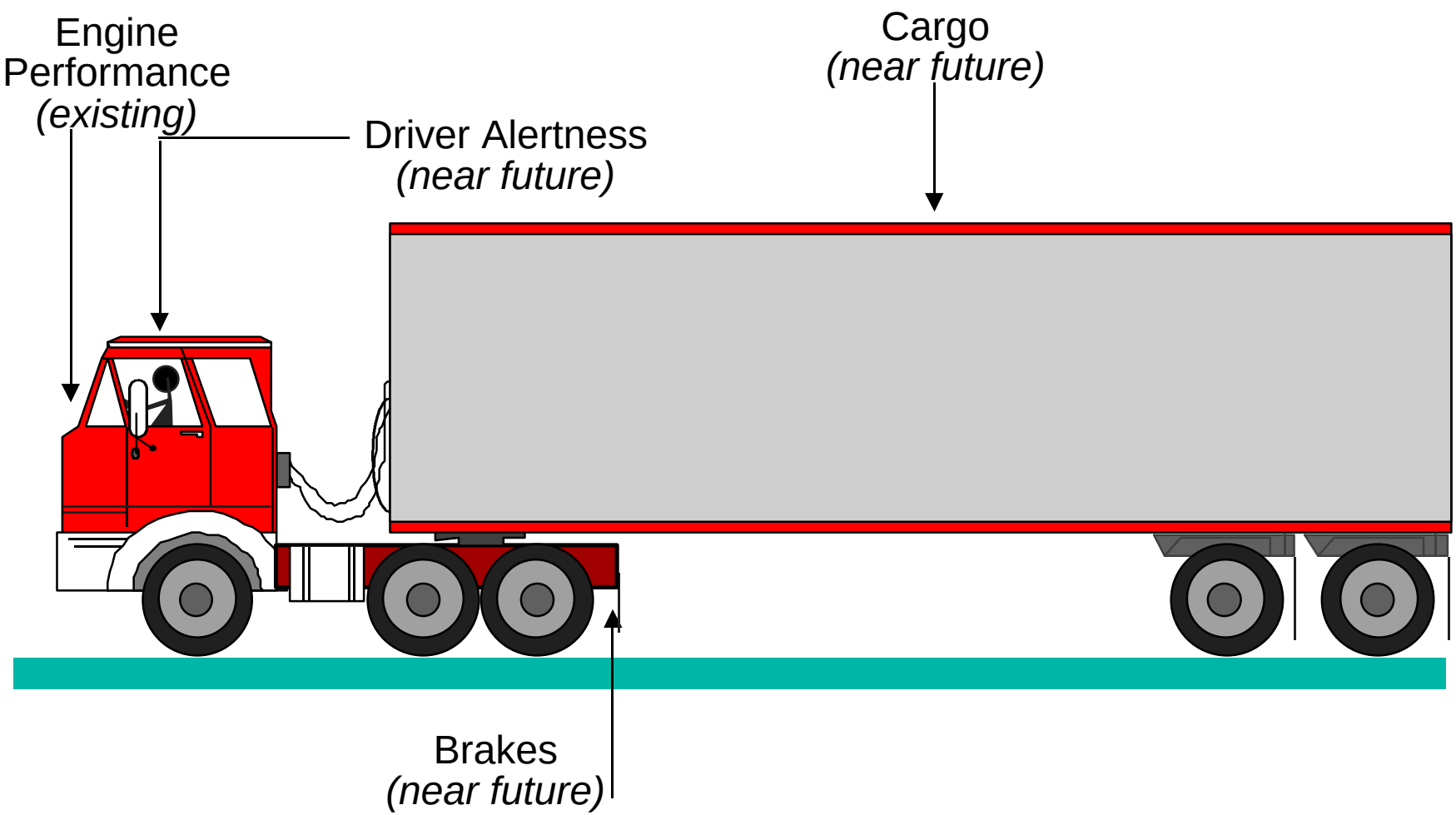
- **Describe** basic safety data flows
- **Identify** the functions of the SAFER and CVIEW systems
- **Understand** how safety and credential data get to the roadside
- **Identify** the role of PRISM in safety assurance

Module Structure

- Safety Systems and Technologies
  - Onboard
  - Roadside
  - Deskside
- Information Flow:
  - Basic
  - SAFER
  - SAFER/Credential
  - CVIEW
  - PRISM
- Safety in Midland
- Summary

Notes

On-Board Systems Supporting Safety Assurance



On-Board Systems Supporting Safety Assurance

All of these systems have the potential to enhance fleet operations by providing performance measures to be used to enhance on-the-job performance by drivers.

Photo Courtesy of Fleet Owner Magazine

Vehicle Safety Monitoring System

This equipment provides the capability to diagnose critical components of the vehicle and warn the driver of potential dangers. These capabilities use a set of on-board sensors to monitor the vehicle's condition and performance, including steering, braking, acceleration, emissions, fuel economy, and engine performance. Problems are identified using processors on board the vehicle. Sensors then provide warnings to the driver, fleet, and/or roadside inspectors in the event of a serious condition.

Driver Safety Monitoring System

This system will provide the capability to determine the driver's condition and warn the driver of potential dangers. This equipment will include driver sensors to assess the suitability of the driver (e.g., fitness, alertness (near future)) to assume manual control of the vehicle.

On-board Cargo Monitoring

This equipment will provide the capability to monitor both interstate and intrastate cargo safety such that enforcement and HAZMAT response teams can be provided with timely and accurate information. This system will include the equipment on board the cargo container such as a communication device and equipment for the processing and storage of cargo material. The system may also include optional sensors for temperature, pressure, load leveling, and acceleration.

ITS Roadside Technologies Supporting Safety

Technologies include:

- Portable computers
- Wireless communications
- Databases and networks
- Sensors
- Portable diagnostic devices

Photo Courtesy of Hicklin Engineering Company

Photo Courtesy of B & G Technologies

ITS Roadside Systems Supporting Safety

Systems

This equipment provides the capabilities for operators to automate the roadside safety inspection process including the use of hand held devices to capture and upload accurate inspection data in a timely fashion. These systems will also provide the capability to collect, store, maintain, and provide safety data and access historical safety data of carriers, vehicles and drivers.

Technologies

Portable computers, wireless communications, databases and networks, sensors, and portable diagnostic devices

ITS Deskside Technologies Supporting Safety

Technologies include:

- Databases/Information Systems
- Algorithms/Analysis
- Communications

ITS Deskside Technologies Supporting Safety

- DESKSIDE SYSTEMS provide for the compilation, analysis and communication of basic safety data about CARRIERS, VEHICLES and DRIVERS. This ongoing process is the infrastructure that makes electronic prioritization and screening of commercial vehicles possible.

- For INTERSTATE operations, it is necessary to compile safety data from many States in order to have a comprehensive picture of an interstate operation. Interstate operations also are subject to Federal jurisdiction. The FHWA uses this assembled safety data for interstate operations (and intrastate hazardous materials carriers) to administer a national motor carrier safety program in cooperation with the States under the Motor Carrier Safety Assistance Program (MCSAP).

- For INTRASTATE operations, the primary database is in the SAFETYNET system at the state level. Intrastate data is sent to MCMIS, however at the present time, it is used only for statistical purposes.

- DATABASES/INFORMATION SYSTEMS

  The principal databases concerning safety are contained in databases maintained at both State and Federal levels. (Examples are MCMIS, SAFETYNET, SAFER and others.)

  Data (such as inspections, crashes and compliance reviews) for both interstate and intrastate carrier operations flow into these databases at the State level and are transmitted electronically to Federal databases.

- ALGORITHMS/ANALYSIS

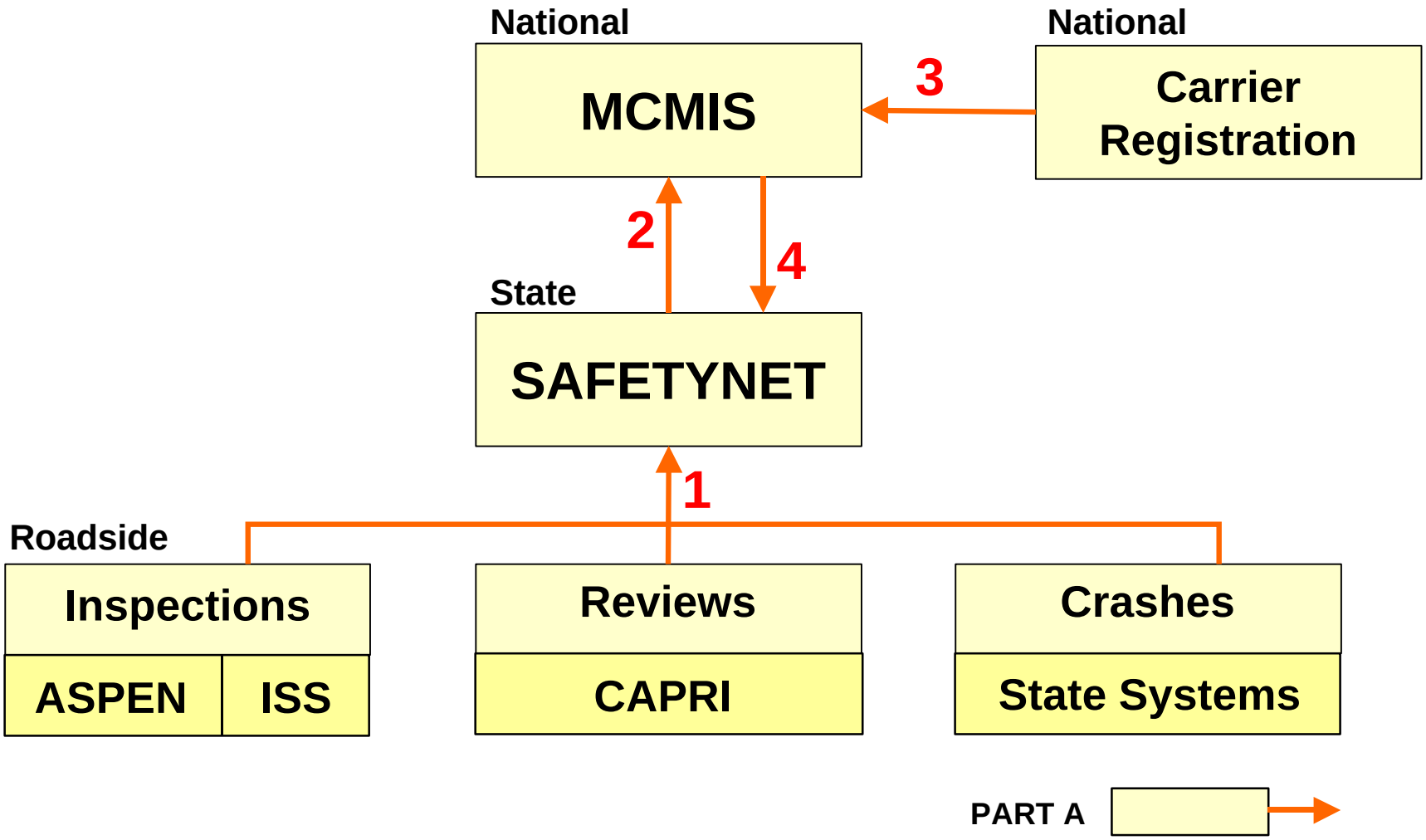
  A most important use of these data is to make an OVERALL SAFETY ASSESSMENT of carrier operations and to PRIORITIZE these for further enforcement activities. Algorithms that combine various safety indicators for a carrier are used for this purpose. (Examples are SAFETY RATING, INSPECTION SELECTION (ISS), SAFESTAT and others.). These algorithms are also used for electronic clearance; whether for PREQUALIFICATION of carriers or ROADSIDE CLEARANCE for non-prequalified carriers.

- COMMUNICATIONS

  The collection of data within a State, the compilation of data from multiple States and the transmission of SAFETY CLEARANCE information to the roadside and other users all require.

  The use of modern data communications systems; wired and wireless. (Examples are AAMVAnet, Internet, FTS2000, CDPD cellular and others.)

Information Flow - Basic



Information Flow - Basic

PART A

- Basic safety data information flows (circa 1995). Where more current statistics are quoted, the year 1998 is indicated in the text.

- INSPECTION, COMPLIANCE REVIEW and CRASH data

  Inspections - Contain data collected during a roadside inspection of a vehicle and driver, principally be State MCSAP (Motor Carrier Safety Assistance Program) personnel. Violations of regulations due to the driver, the vehicle, or specifically related to hazardous materials are included. Most States use ASPEN, some have developed their own software.

  Compliance Reviews - On-site reviews of carriers and hazardous material shippers are conducted by OMC field staff and State staff under MCSAP. These take place in the offices of the company and cover compliance with critical parts of the Federal Motor Carrier Safety Regulations. All Federal staff and most States use CAPRI software.

  Crashes (accidents) - Police accident reports for commercial motor vehicles usually originate in State motor vehicle accident databases and are transferred electronically into SAFETYNET. Uniform data elements are made possible by adherence to the National Governor's Association truck/bus accident elements.

PART A (Continued)

- **FLOW 1**

  All these data types are entered into the local SAFETYNET (State or Federal Field Office) principally by electronic transfer from source systems. Data is for both interstate and intrastate carriers.

- SAFETYNET

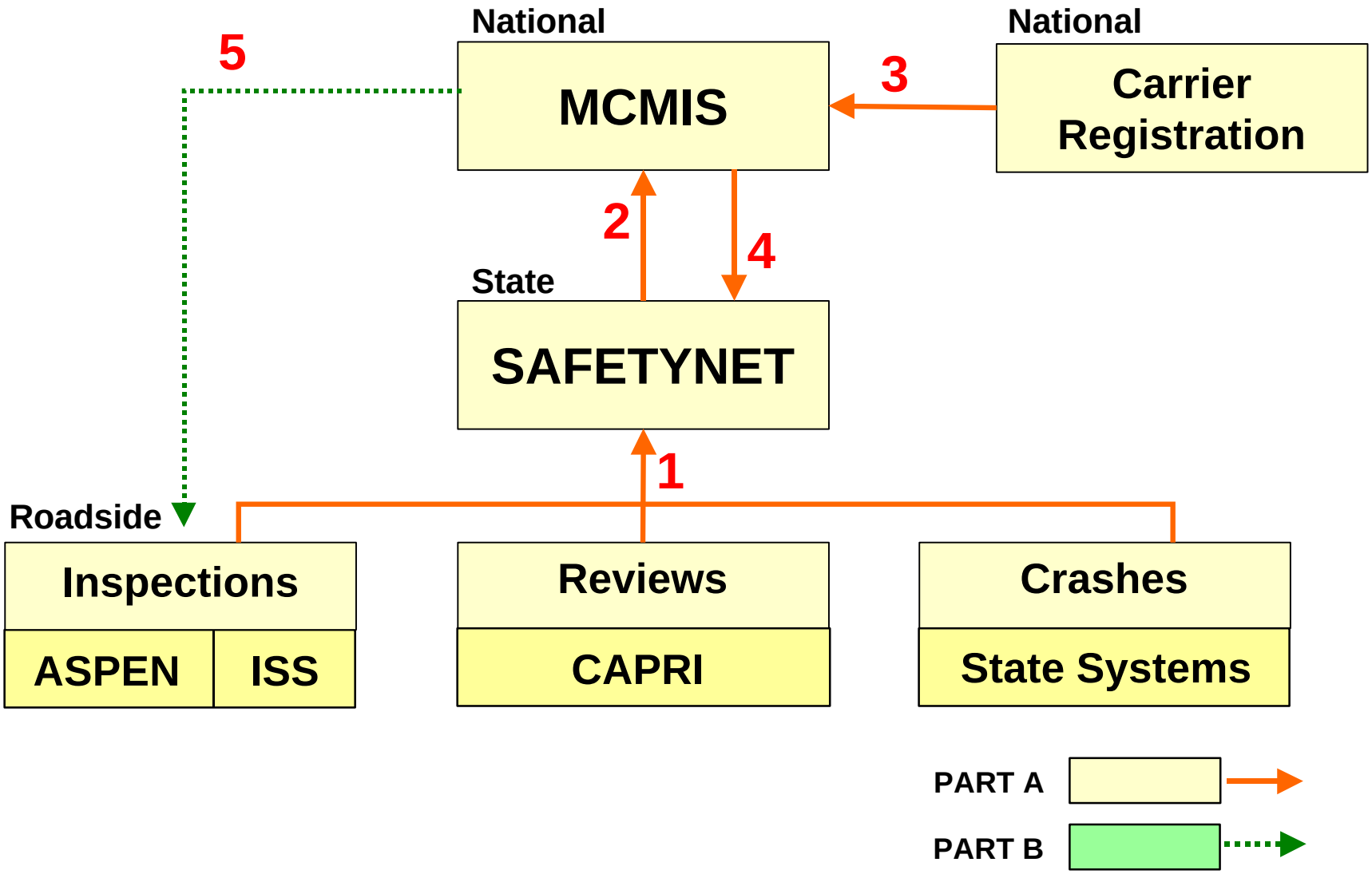
  SAFETYNET is the distributed component of the information system, operating in State offices and Federal field offices both as local management information systems and to communicate data electronically to and from MCMIS (the Motor Carrier Management Information System). All Federal offices and most States use the Federally-provided SAFETYNET software in microcomputer LANs. Some States use State provided software or a combination of both.

- **FLOW 2**

  After processing at the SAFETYNET level, the data are sent electronically to MCMIS. While both interstate and intrastate data go to MCMIS, the intrastate data are used by MCMIS only for statistical purposes while the interstate data are used for many carrier-level enforcement purposes. The Federal standards for timeliness of data to MCMIS are (1998):

  INSPECTIONS: 7 days if done on portable computer, otherwise 21 days.
  COMPLIANCE REVIEWS: 7 days if done on a portable computer, otherwise 21 days.
  CRASHES: 90 days.

Information Flow - Basic (Cont.)



Information Flow - Basic (Cont.)

PART A (Continued)

- MCMIS

  The Motor Carrier Management Information System (MCMIS) is the national system that consolidates and processes motor carrier safety data from all sources. It operates on a mainframe computer at the Transportation Computer Center at DOT Headquarters in Washington, D.C. The system (1998) contains safety records on some 400,000 interstate motor carriers, with over 150,000 safety and compliance reviews and the annual addition of approximately 2 million roadside inspection records and 100,000 crash records.

- CARRIER REGISTRATION

  All interstate motor carriers (private and for hire) are required to identify themselves to the FHWA using a form MCS-150. It provides basic carrier identifying information and data on the type and size of operations. A USDOT NUMBER is then issued to the carrier, which the carrier must post on all its vehicles.

- **FLOW 3** (MCS -150 on paper)

- **FLOW 4**

  MCMIS provides many types of consolidated data and reports back to State and Federal SAFETYNET systems, mostly by electronic means. Carrier profiles and prioritizations based on algorithms that consider all of a carrier's safety data are principal examples. Carriers which have COMPLIANCE REVIEWS are also given a SAFETY FITNESS RATING. Much of this same information is available to industry and the public via written request or a toll-free phone number or the Internet.

PART B

- **FLOW 5**

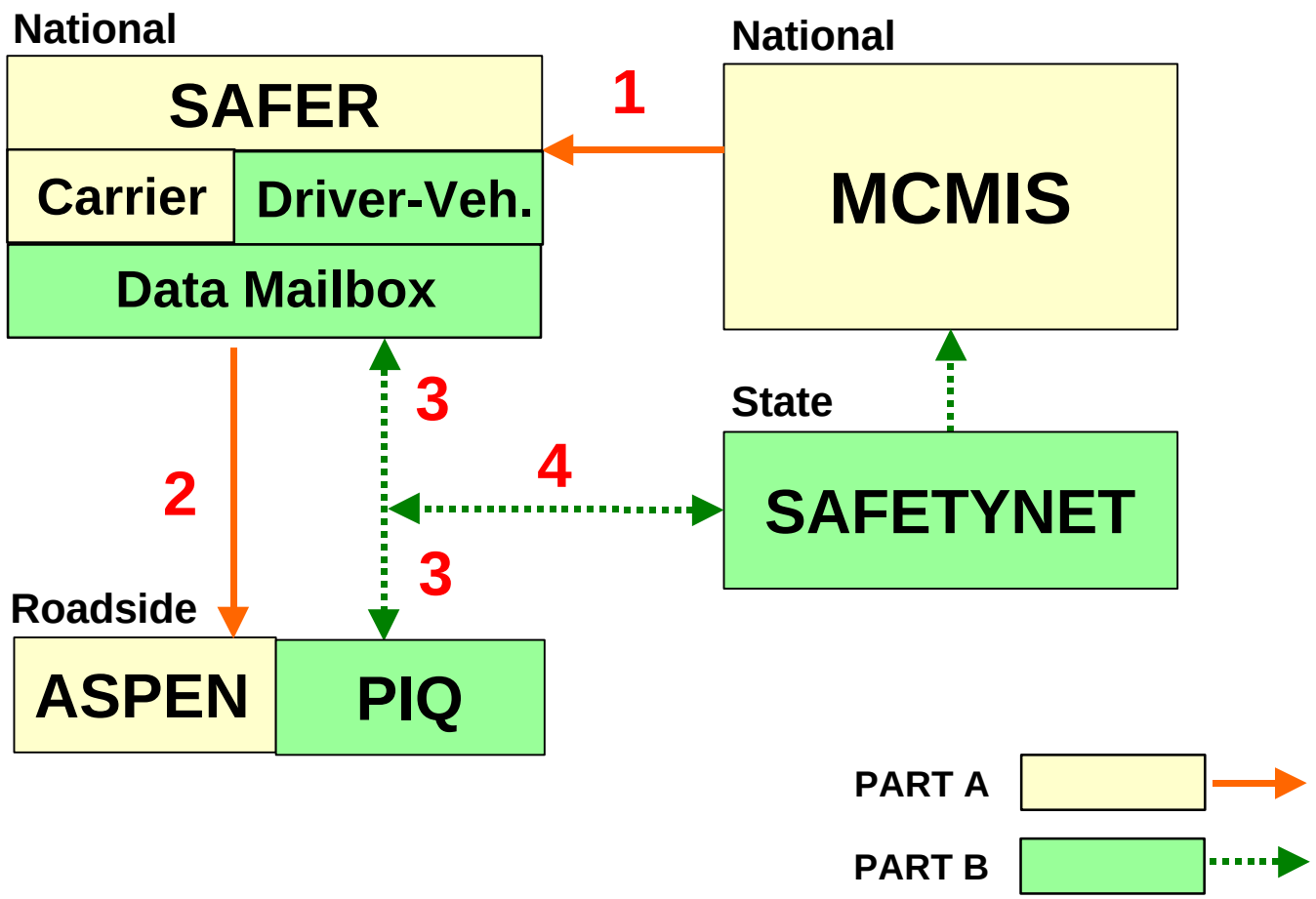
  MCMIS supplies carrier ID and past safety data for each interstate carrier to the ASPEN ISS (Inspection Selection System) which is an algorithm to prioritize vehicles for inspection at the roadside. MCMIS creates a carrier data file about once every 90 days. This file includes 24 months of data for each interstate carrier in the nation. FHWA sends this data file to all States that use ASPEN, who then may subset it and distribute it to all their ASPEN users.

  This data record includes, for each interstate carrier, ID info such as DOT and ICC number, name and address, and summarized safety data from past inspections, compliance reviews, crashes, and enforcement activities. ISS takes these data and scores carriers for inspection priority. A carrier may get a high priority in either of two ways: 1) poor past safety performance, or 2) few prior inspections compared to number of power units.

NEEDED IMPROVEMENTS

- ITS/CVO electronic screening requires fast, roadside electronic access to safety data.
- Many other users (industry, public) also desire Aon-line@ access to safety data (information highway).
- The 90 day refresh cycle for the carrier safety files to ISS is too long.
- The safety snapshot requires information about individual vehicles and potentially drivers.

Information Flow - SAFER



Information Flow - SAFER

PART A

• SAFER

SAFER is a national system that provides standardized carrier, vehicle and driver datasets (snapshots and profiles) containing limited safety and credentials information on-line to authorized users. The principal subsystems are as follows:

• SAFER/CARRIER

The SAFER/CARRIER system makes carrier "snapshots" and "profiles" available electronically to all users - ASPEN/ISS, Federal, State, industry and public. A **snapshot** is an electronic summary record of a carrier's safety information (safety rating, summary of inspection violations, crashes, etc.), suitable for user viewing or for computer system processing. A **profile** is a detailed report of a carrier's safety history, suitable for a user to study as part of a more in-depth inquiry or investigation.

This system also has a "push" mode that detects significantly changed carrier safety data and sends out changed records to preregistered users ("subscribers"). Users can preregister for carriers they are interested in (e.g., a list of carriers insured by an insurer, all carriers domiciled in a state, all national carriers, etc.).

ASPEN/ISS uses carrier snapshot data to prioritize carriers for inspection. ASPEN users can subscribe to SAFER and thus receive weekly updates to the carrier snapshots used in ISS.

PART A (continued)

• FLOW 1

MCMIS detects those carriers whose safety data has changed (e.g., new inspection, review or crash) and sends new snapshots for these carriers to SAFER on a weekly basis.

• FLOW 2

SAFER/CARRIER makes these updated snapshots available on-line. For subscribers, like ASPEN/ISS users, SAFER "pushes" these updated snapshots into the user's DATA MAILBOX for electronic pick up by the user.

PART B

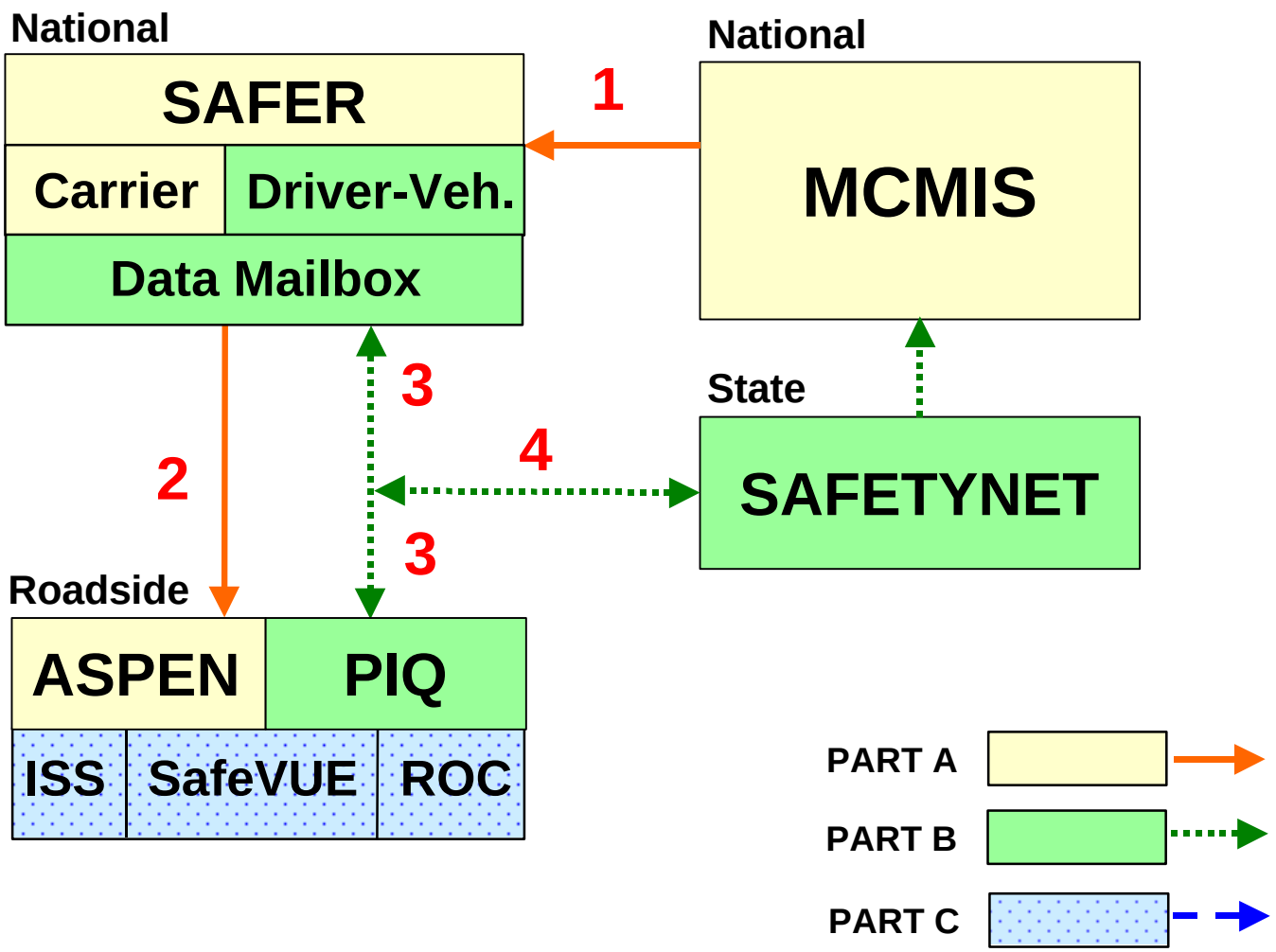
• SAFER/DRIVER-VEHICLE

The SAFER/DRIVER-VEHICLE system is an on-line national database of individual vehicle and individual driver data, retrievable by vehicle plate number, vin or driver license number. It will provide snapshots in both query and subscription ("push") mode, similar to the SAFER/CARRIER system. At present, it includes only vehicle and driver safety data from past roadside inspections.

• SAFER/DATA MAILBOX

The SAFER/ DATA MAILBOX system is to allow inspections to be immediately uploaded from ASPEN at the roadside into SAFER so that the last inspection of a specific vehicle and driver can be available to enforcement officials in all States very quickly. This is to support electronic safety clearance and to verify correction of out-of-service inspection violations. (The upload of inspections from ASPEN directly to the DATA MAILBOX of course requires wire or wireless data communications to the roadside.)

Information Flow - SAFER



Information Flow - SAFER

PART B (Continued)

• ASPEN/PIQ

The PIQ (Past Inspection Query) is the module of ASPEN that retrieves past inspections of a specific vehicle (by plate number) and driver from the SAFER/ DRIVER-VEHICLE system. (The download of past vehicle inspections directly from the DATA MAILBOX to ASPEN of course requires wire or wireless data communications to the roadside.)

• **FLOW 3**

This flow represents individual driver/vehicle inspections moving both ways between ASPEN at the roadside and the SAFER/MAILBOX. New inspections move "up" from ASPEN to SAFER and past inspections move "down" when retrieved by ASPEN/PIQ from SAFER.

• **FLOW 4**

Actually, there are several ways a State may handle new inspections. States may either 1) send new inspections directly from ASPEN to the SAFER/ MAILBOX and later pick them up using SAFETYNET for State processing, or 2) send inspections from ASPEN to the State SAFETYNET then on to SAFER/ MAILBOX later, after State processing. Data flow 4 is a generalized representation of these 2 options. The first option obviously has the potential of making inspections available to all users very rapidly if roadside communications permit.

PART C

• ISS / SafeVUE / ROC

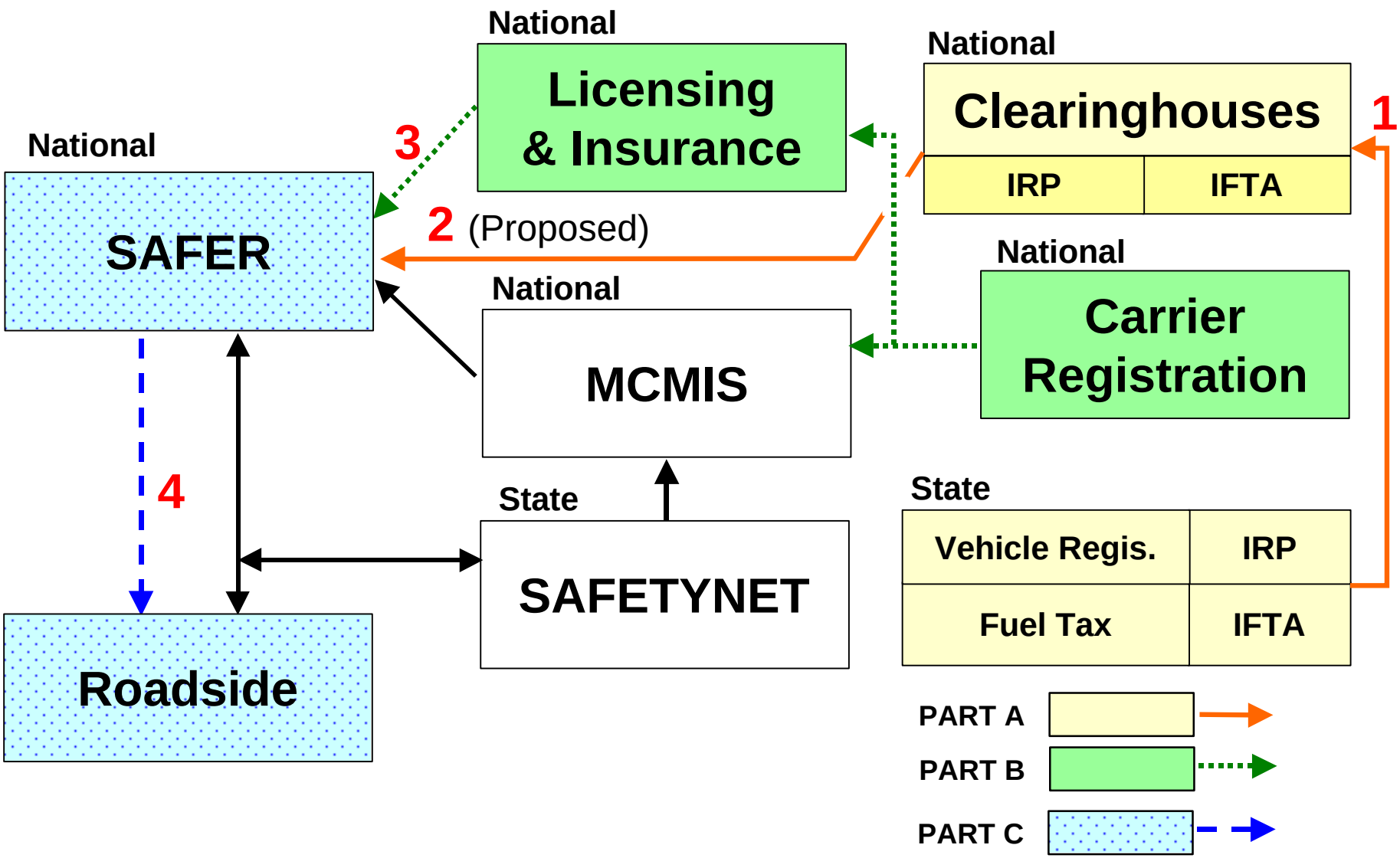
There are several ways that SAFER information can be obtained:

- ISS This software/algorithm prioritizes carriers using SAFER snapshot data. It is a part of ASPEN and SafeVUE but also can be implemented as a module in other software systems.
- SafeVUE This is microcomputer software that stands alone to obtain and manage snapshot and other data from SAFER. It is used by non-ASPEN users to access SAFER data. For example, a carrier pre-qualification program (e.g., HELP PrePass), scale house vehicle screening operation or an insurance company that subscribes to SAFER for carriers it insures.
- ROC A "roadside operations computer" that is part of an electronic screening process at a roadside site. For a custom ROC, modules are available that can be built into it that will enable it to obtain data from SAFER.
- WWW.SAFERSYS.ORG A short version of the SAFER snapshot for a carrier can be obtained for free from this internet site. It is ad-hoc only, one carrier at a time. Not a replacement for subscription service but good for single carrier queries.

NEEDED IMPROVEMENTS

- In addition to safety data, on-line access to credential data (IRP, IFTA, Insurance, OS/OW permit, driver license) is also needed for electronic screening.
- The SAFER design, with the SAFER/CARRIER and SAFER/ DRIVER-VEHICLE systems, along with the snapshot concept and the "push" subscription service, was well suited for the inclusion of credential data.

Information Flow - SAFER / Credential



Information Flow - SAFER / Credential

PART A

• VEHICLE REGISTRATION/FUEL TAX

State systems for the administration of the International Registration Plan (IRP) for commercial vehicles and the International Fuel Tax Agreement (IFTA) for interstate operations.

• CLEARINGHOUSES - IRP/ IFTA

National information systems designed to assemble in one database certain information about the registration and fuel taxation of interstate carriers and vehicles. These are in various stages of development and varying levels of state participation.

• **FLOW 1**

State IRP/IFTA systems send certain data to the national clearinghouses. It is not decided yet if this will be just demographic data or will include tax status information.

• **FLOW 2 (Proposed)**

It is envisioned that national clearinghouses will send updates of vehicle registration and fuel taxation data to SAFER for distribution.

PART B

• LICENSING & INSURANCE

The carrier licensing ("authority") and insurance certification required by the former ICC remain in effect for most for-hire carriers (about 85,000 carriers). The licensing and insurance (L & I) information system registers these carriers and tracks their insurance.

• **FLOW 3**

The L & I system sends updates of for-hire carrier insurance status to SAFER.

PART C

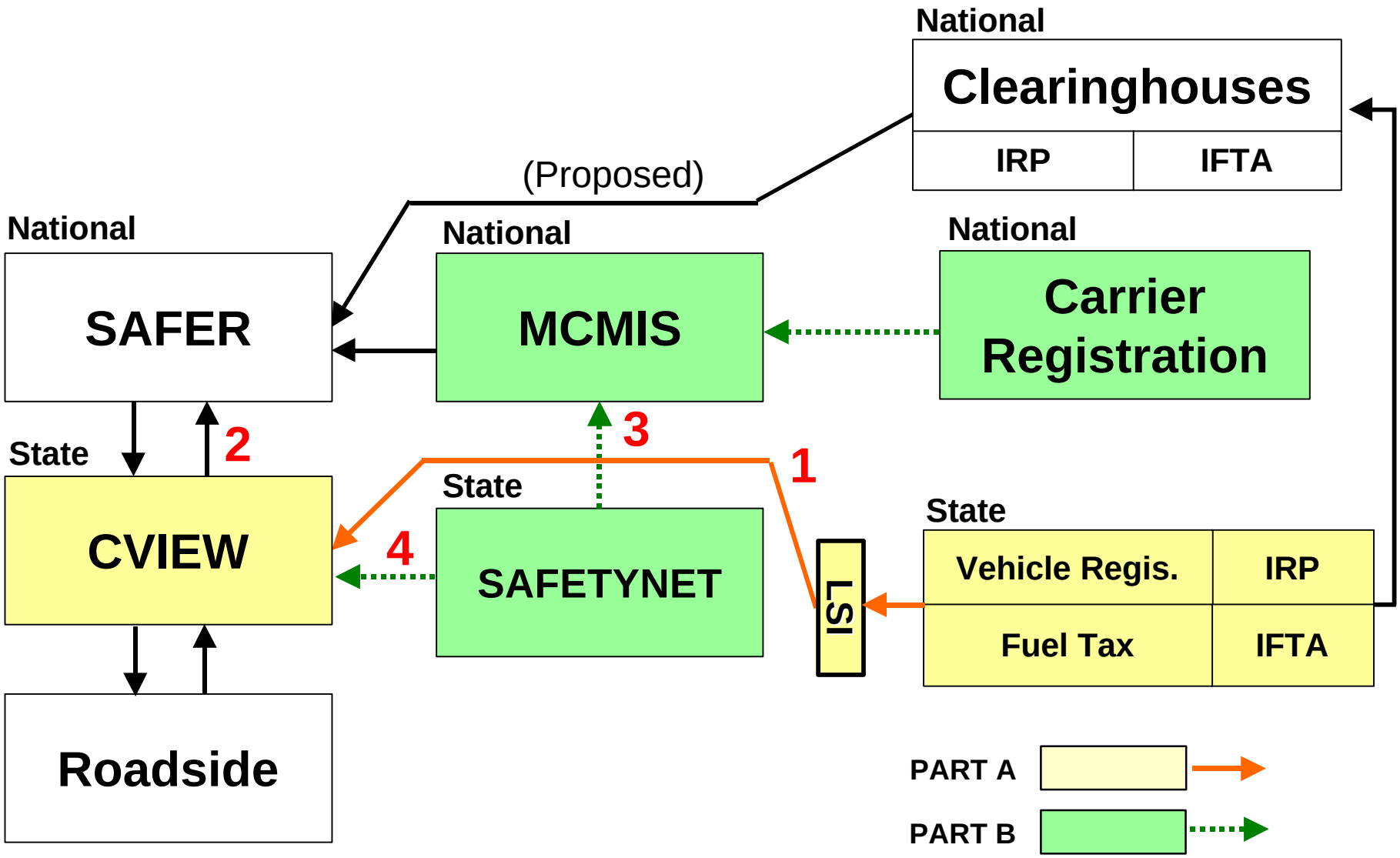
• **FLOW 4**

SAFER includes IRP, IFTA and INSURANCE (for hire) credential data in the snapshot for interstate carriers and vehicles and "pushes" this information to ASPEN and other roadside clearance users.

NEEDED IMPROVEMENTS

- The delivery of **interstate** safety, registration and taxation information to the roadside may be handled by interstate clearinghouses such as MCMIS, IRP, and IFTA and distributed via SAFER. However, states will be participating to varying levels in the IRP and IFTA Clearinghouses for interstate data.
- Additionally, some method is needed to deliver similar **intrastate** data to roadside locations within a State. These data are not processed in the clearinghouses and are not uniform from State to State. In most cases, there is no roadside access to intrastate vehicle registration, fuel taxation and permit data within a State.
- An underlying problem is that there was no uniform way of identifying intrastate carriers, as with the USDOT registration for interstate carriers. Some States have intrastate carrier registration and carrier numbers, many do not.
- A related problem was that the scheme of having SAFER communicate data directly to roadside sites would put a tremendous load on SAFER.

Information Flow - CVIEW



Information Flow - CVIEW

PART A

• CVIEW

The CVIEW system was devised to address these needs. Essentially, CVIEW does on a State level what SAFER does nationally. It has the potential to consolidate safety, registration, taxation and permit information for intrastate carriers from State "legacy" systems that house these data and makes this available electronically to roadside locations. The CVIEW software is essentially a "clone" of the SAFER software except it runs at he State level and an interface must be custom programmed to communicate with each State=s legacy systems using an LSI (Legacy System Interface).

CVIEW can also transmit data to and from SAFER. CVIEW can be a subscriber to SAFER on behalf of the entire State and receive carrier, driver and vehicle snapshot updates from SAFER then forward this to each user (e.g., each ASPEN system) in the State. For these data transmittal functions, CVIEW also incorporates a data MAILBOX like SAFER. CVIEW can also (optionally) send interstate registration, taxation and permitting data to SAFER for States that do not participate in the IRP or IFTA clearinghouses.

• **FLOWS 1 & 2**

Flow 1 represents the transmission of registration and fuel tax information from State legacy systems to the State CVIEW. This flow is essential for INTRASTATE data and may also be optionally used for INTERSTATE data instead of the clearinghouse route. For interstate data, the State CVIEW will send this to SAFER, as represented by FLOW 2.

PART B

• CARRIER REGISTRATION

The problem of providing for the uniform identification of intrastate carriers has been addressed by the FHWA. States may now (optionally) register their intrastate carriers in the MCMIS system and receive USDOT numbers for these carriers which the State may require carriers to post on their vehicles. Some 11 States are now doing so.

• **FLOWS 3 & 4**

The MCMIS registration of intrastate carriers and the fact that intrastate carrier inspection, crash and (potentially) compliance review data can be sent from SAFETYNET to MCMIS raises the possibility that MCMIS and SAFER could provide all the same data processing and communications services for intrastate carriers that they do for interstate.

FLOWS 3 & 4 represent different ways of delivering intrastate safety data to the roadside. FLOW 3 depicts the option of sending intrastate data to MCMIS and having it thus processed through to SAFER. FLOW 4 represents the option of sending of intrastate carrier safety data within the State from SAFETYNET to CVIEW for delivery to roadside stations within the State. These options have different cost and policy implications and which will prevail remains to be seen.

NEEDED IMPROVEMENTS

- The prioritization of carriers for inspections and for compliance reviews and other enforcement actions was not based on a unified scheme.
- The SAFETY RATING process for carriers was in need of revision and a uniform, comprehensive safety assessment and improvement process was needed to replace the safety rating.
- The issuance of VEHICLE REGISTRATION at the State level had no relationship to the safety of the CARRIER and a method to relate these is desired.

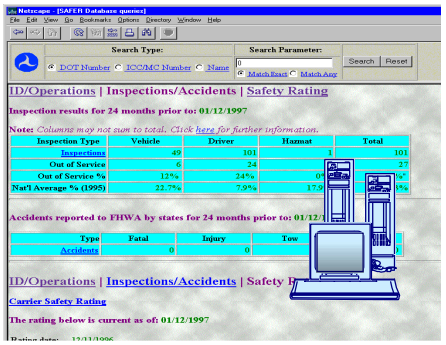
Summary of SAFER/CVIEW Data Services

- DATA ABOUT (interstate & intrastate)
  - Carriers
  - Vehicles
  - Drivers

- TYPES OF DATA
  - ID/Characteristics
  - Safety (MCMIS, SAFETYNET)
  - Vehicle Registration (IRP CH, State)
  - Driver Licensing (CDLIS)
  - Fuel Taxation (IFTA CH, State)
  - Insurance (ex-ICC database, SSRS)
  - OS/OW permit (Future)

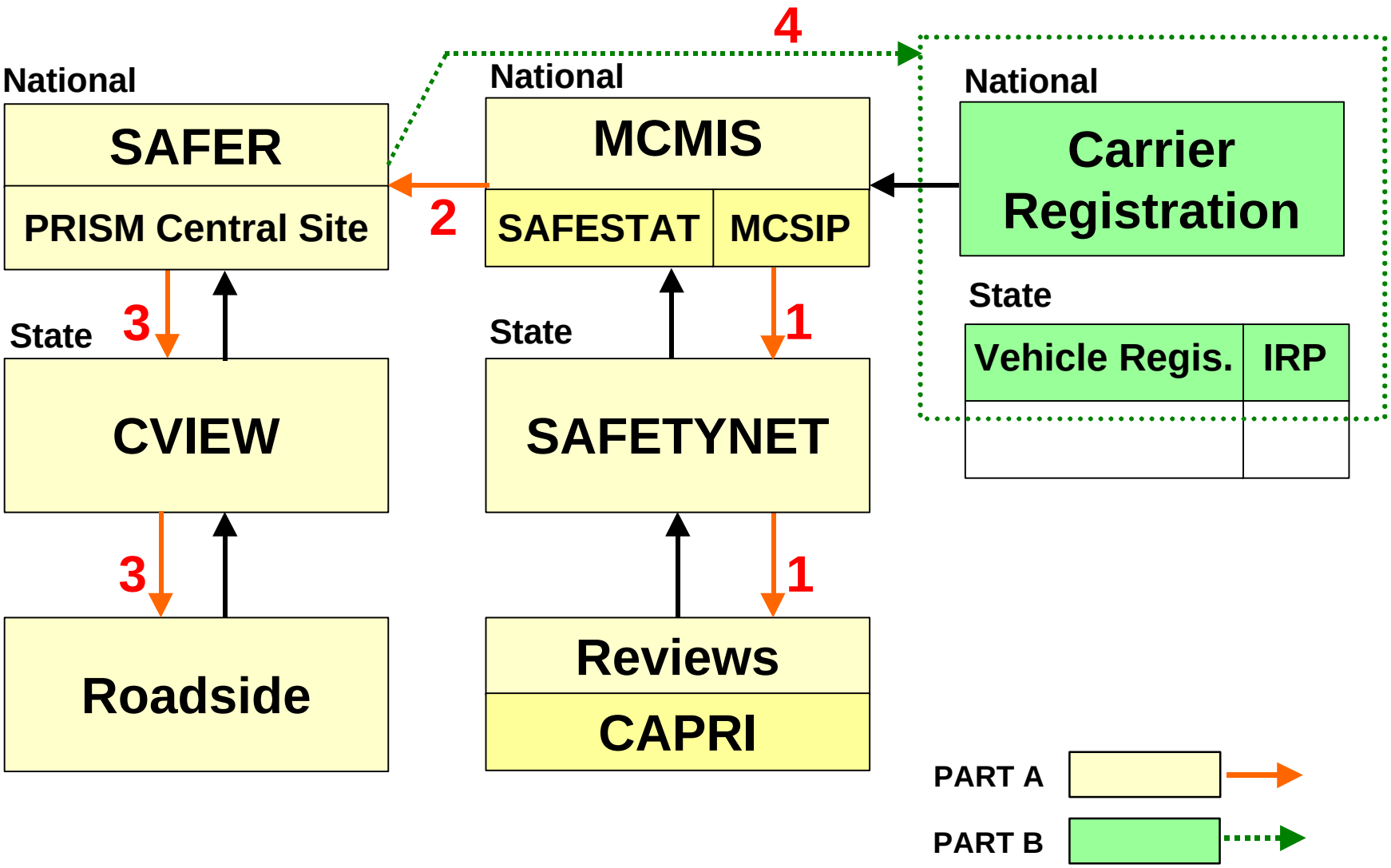
- FORM OF DATA
  - SNAPSHOT
    - Summary statistics
    - Long, flat, fixed-format record
    - Viewing or computer processing
  - PROFILE
    - Details of data (each event)
    - Viewing investigative/enforcement

- WAYS TO REQUEST
  - QUERY
    - Request data item when you need it
  - SUBSCRIPTION
    - Standing order for updates whenever basic data changes. Can be for specified carriers (vehicles), by geography or by other parameters. E.G., vehicles registered to operate in my State; carriers which have been inspected before in my State. National subscriptions (e.g., all interstate carriers in the country) are feasible for roadside clearance purposes.



Notes

Information Flow - PRISM and Related Systems



Information Flow - PRISM

PART A

- PRISM (Performance and Registration Information Systems Management)

  PRISM is not an information system per se. It is a comprehensive program of motor carrier safety assessment, enforcement and improvement. The core concept of PRISM is the linking of VEHICLE REGISTRATION at the State level to acceptable carrier SAFETY PERFORMANCE. **PRISM utilizes systems and components that make up the larger CVISN architecture.**

- SAFESTAT

  The safety assessment algorithm at the core of PRISM is SAFESTAT. From a comprehensive array of MCMIS carrier performance data (inspections, crashes, reviews, enforcement cases, citations) SAFESTAT computes an INDICATOR and CATEGORY for carriers that have sufficient data. Carriers in the highest categories are subject to a notification procedure and sequence of enforcement activities (e.g., compliance review) and improvement opportunities.

- MCSIP

  MCSIP (The Motor Carrier Safety Improvement Program) tracks carrier safety improvement through a series of levels intended to bring the carrier into full safety compliance. The MCSIP LEVEL is a crucial measure of a carrier's current status in this improvement process.

- **FLOWS 1 & 2**

  The SAFESTAT indicator and category information, as well as a carrier's current MCSIP level, are transmitted to SAFER as part of the carrier snapshot and are subsequently transferred to the State vehicle registration office for their reference. They are also made available through on-line MCMIS to State MCSAP and Federal field offices for the administration of these enforcement activities.

PART A (continued)

- **FLOW 3**

  The SAFESTAT indicator and category information, as well as a carrier's current MCSIP level, are transmitted from SAFER to roadside electronic screening sites as part of the carrier snapshot. SAFESTAT is being integrated into ISS and probably will be adopted as a uniform national criterion for electronic safety screening, inspection selection and carrier bypass.

PART B

- CARRIER REGISTRATION/VEHICLE REGISTRATION

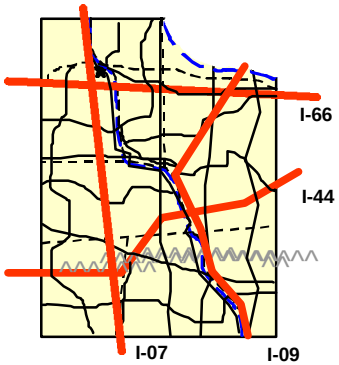
  PRISM requires the linking of CARRIER REGISTRATION (USDOT, SSRS) to VEHICLE REGISTRATION (IRP) at the State level. As a part of vehicle registration, participating States assure that the entity registering vehicles has a DOT number; that a carrier (thus a DOT number) is assigned to each vehicle being registered; and that each carrier meets the required MCSIP safety level. Ultimately, subject to State laws, vehicle registration may be denied to unsafe carriers. As part of this process, the USDOT number of the carrier is recorded as part of the vehicle registration electronic record, thus linking the vehicle to the responsible carrier for roadside screening operations such as license plate readers.

- **FLOW 4**

  This flow represents the carrier identification information and the MCSIP level being accessible from SAFER to State vehicle registration authorities for the purpose of assuring that the carrier is registered and has an acceptable MCSIP level.

Midland's Safety Assurance Issues

- A few local and interstate carriers are involved in ~30% of all the crashes in Midland
- Midland is ranked 11th in the nation with 3.5% of the fatal large truck crashes
- Crash patterns in Scrunch Alley match the national averages
- Aspen is used by 50% of the inspectors; want to expand



Midland's Safety Assurance Issues

Crashes

Normally, crashes seem to be spread out fairly evenly across carriers. But Midland has found that there is a fairly small group which is involved in an inordinately high number of crashes. The vehicles are carrying a variety of goods, ranging from agricultural to manufactured products.

The number of large commercial vehicles involved in fatal crashes has been on the rise in Midland. There has been a steady increase in large truck traffic over the past few years, and a corresponding increase in fatalities. Non-fatal crashes have also increased.

ASPEN

An inspection support system used on a portable computer, makes inspection reporting faster, and most inspectors want it.

Scrunch Alley

The Scrunch Alley crash statistics are similar to those experienced nation-wide.

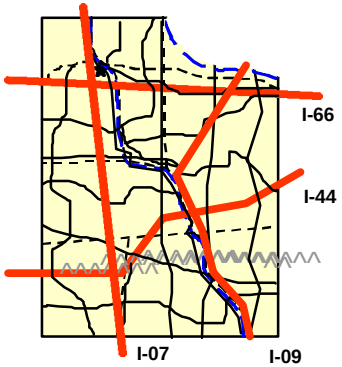
- Daylight, weather fair, commercial vehicle (CV) driver not at fault (60%)
- Poor lighting, poor road condition (23%)
- Drowsy CV driver (5%)
- Other (12%)

But since so many crashes occur in this short stretch of road, Midland hopes to be able to focus efforts here to significantly improve the state-wide crash figures.

Midland's Safety Assurance Objectives

Improve highway safety by focusing enforcement resources on high-risk carriers, drivers, and vehicles

- Improve deskside and roadside access to safety information
- Improve safety inspection and review processes
- Enhance driver's ability to monitor the en route safety status of the vehicle and driver



Notes

Objective 1

Improve deskside and roadside access to safety information.

Strategies:

- Evaluate past safety performance when issuing credentials
- Evaluate credentials when screening at the roadside

Information systems containing safety history include:

- SAFER/CVIEW
- CDLIS
- SAFETYNET

Notes

Objective 2

Improve safety inspection and review processes.

- Improve old manual inspection selection with new automated process using information systems
  - Automated check of databases using snapshots
  - Automated inspection decision
- Provide ASPEN to all inspectors

Objective 2

Midland's Inspection Selection Method (Current): Manual and Subjective

1. Visual quick check of vehicle
   - General appearance, decals, driver
2. Pull in if visual check suggests
3. Manual check of in-cab credentials
4. Radio or telephone check of databases
   - CDLIS (Commercial Driver License Information System)
   - Safety Information System
5. Operator makes inspection decision

Midland's Inspection Selection Method (Proposed): Automated and Objective

1. Identify carrier, vehicle, and driver (electronically using DSRC, if equipped)
2. Automatic check in local database of carrier/vehicle/driver snapshots (includes carrier SAFESTAT score)
3. Automated inspection decision
4. Inspector may manually override automated decision

How could ITS/CVO Improve Safety in Midland and Your Jurisdiction?

1. Prioritize Midland's various safety strategies.

   Hint: Consider the effectiveness of the solutions in light of the "facts".

2. Are these the right options for Midland? Are there other solutions which are better?

   Why?

3. Are these strategies applicable to your jurisdiction?

How could ITS/CVO Improve Safety in Midland and Your Jurisdiction?

Exercise Notes:

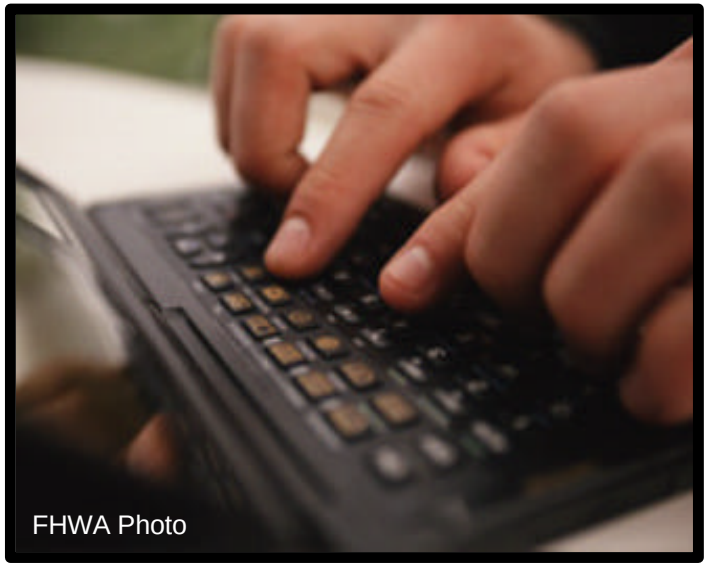
Recap & Questions

Module Objectives:

- Describe basic safety data flows
- Identify the functions of the SAFER and CVIEW systems
- Describe the snapshot and profile data items
- Understand how safety and credential data get to the roadside
- Identify the role of PRISM in safety assurance

Any Questions?

Photo Courtesy of Fleet Owner Magazine


FHWA Photo

MODULE 4

ITS/CVO Program Areas: Credentials Administration

Credentials Administration

Program Areas

Credentials Administration	Electronic Screening	Carrier Operations
• Electronic credentialing • Clearinghouses • Interagency data exchange • Interstate data exchange	• Automated weight and credentials screening • International electronic border clearance	• Fleet and vehicle management • Traveler information systems • Hazardous Materials incident response

CVISN Architecture (Technical Infrastructure)

Mainstreaming and Deployment Planning (Organizational Infrastructure)

Learning Objectives

Participants will be able to:

- **Define** Current CVO Credentialing Processes
- **Identify** Purpose / Benefits of Electronic Credentialing
- **Identify** Technologies to Enable Electronic Credentialing
  - Credentialing Systems
  - EDI
  - Open Standards
- **Define** Interagency Data Transfer
- **Define** Interstate Data Transfer

Module Structure

- Overview
- Electronic Credentialing
- EDI (Electronic Data Interchange)
- CAT (Carrier Automated Transactions) Demonstration
- Clearinghouses
- Midland's Plans
- Summary

Components Of Credentials Administration

- Electronic Credentialing
- Interstate Credentials Data and Fee Exchange
- Interagency Credentials Data Exchange

Credentials Administration Objectives

Objective: Streamline Credentials and Tax Administration

- Enable electronic credentialing and tax filing
- Provide credentials data to other agencies / roadside
- Enhance interstate data and funds exchange

Expected Benefits

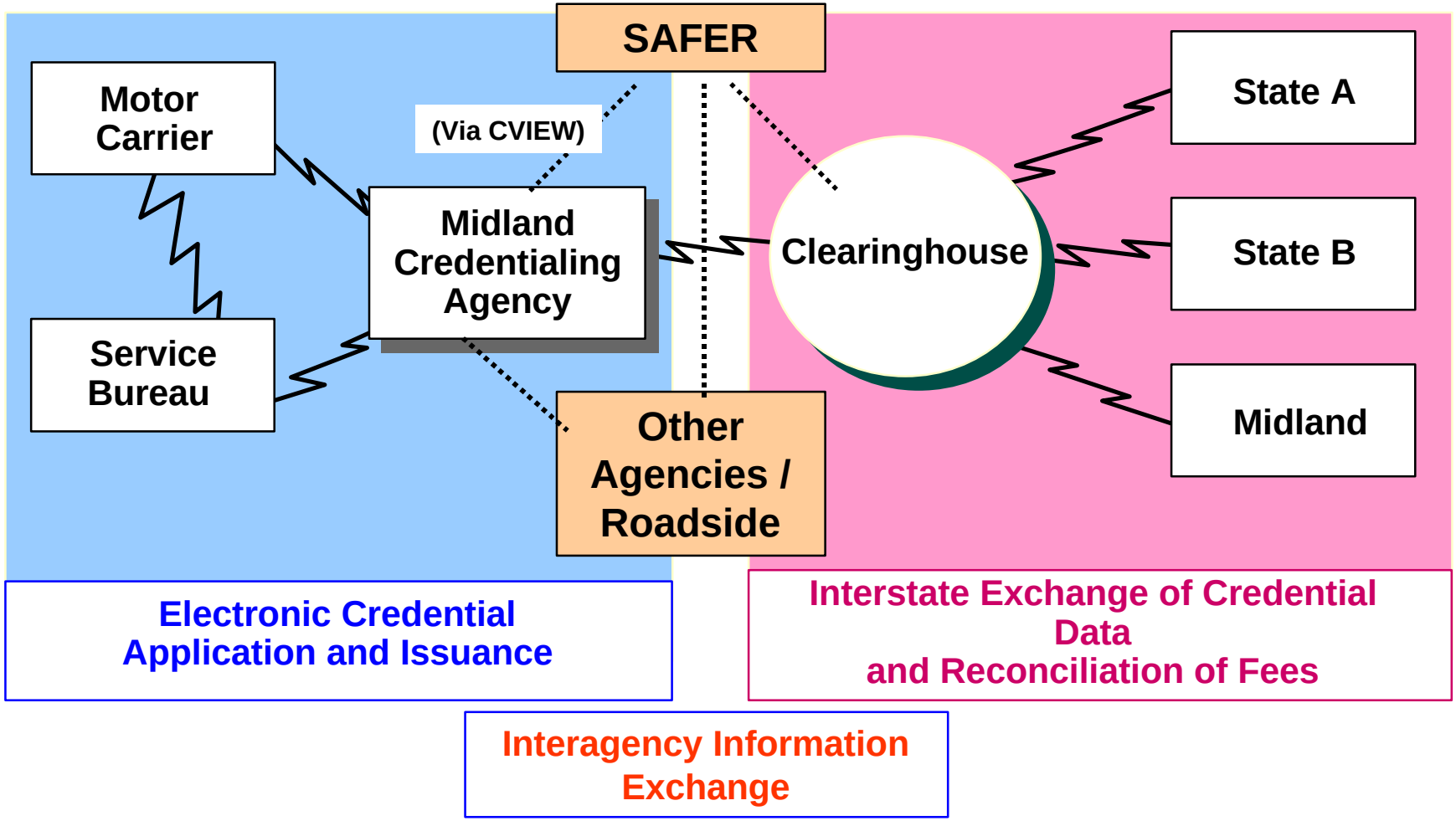
- Get vehicles on the road faster
- Reduced cost and red tape for agencies and carriers
- Improved regulatory compliance - level playing field

Credentials Administration Overview

The Credentials Administration ITS/CVO capability area includes:

- All aspects of applying for, reviewing, and granting CVO credentials (IFTA, IRP, Intrastate Registration, Carrier Registration, CDL/DL, OS/OW Permits, HazMat Permits, Titling); paying the associated fees
- Filing returns on fuel taxes; paying the associated CVO taxes and fees
- Managing information about credentials and tax payment status
- Providing info to roadside enforcement and administrative users
- Supporting base state agreements and associated fee payment reconciliation
- Expected benefits of applying ITS/CVO to Credentials Administration
  - 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 Operational Concept



International Registration Plan

Scenario *after* ITS/CVO Implemented:

1. State system initiates renewal process by sending renewal reminder (including IRP information on file) to carrier system via EDI
2. Carrier system and, optionally, carrier personnel responsible for vehicle registration checks renewal information, updates as needed, and returns to state system via EDI.
3. State system checks data in received transaction. Computes fees due. Sends equivalent of invoice to carrier via EDI.
4. Carrier system initiates EFT to pay fees. Involves sending a transaction to the state and to carrier's bank.
5. Once fees are processed, state IRP system issues electronic equivalent of cab card to carrier system via EDI, updates vehicle snapshots, and prints physical cab card.
6. State mailing center mails cab card to carrier.
7. Periodically, the state system transmits processed applications to the IRP Clearinghouse, including an accounting of fees received.
8. Monthly, the IRP Clearinghouse computes net fees due to/from states and informs states.
9. States check and make corrections.
10. IRP Clearinghouse initiates fee transfers according to net due/owed each state.

Key Concepts

- Paperless Enforcement
- Data Access
- Standard Snapshots
- Flexible Implementation

Key Concepts (cont.)

- **Electronic credentials and paperless vehicle** - Using open standards, commercial vehicle operators apply for and receive credentials electronically. At some point in the future, by equipping the vehicle with a tag and using the identifiers retrieved from the tag as indices into infrastructure data, it will be possible to reduce or eliminate altogether the need to carry paper permits and other paperwork on the truck. Paper copies will become backup material rather than primary sources of credential information.

- **Electronic data access** - Information sharing within a single jurisdiction and across jurisdictions using electronic networks is a cornerstone of the ITS/CVO initiative. Information systems are only as good as the quality of the data they use. Data must be accurate, current, and safe from tampering or unauthorized disclosure. Authoritative sources are the official repositories for the data.

Key Concepts (cont.)

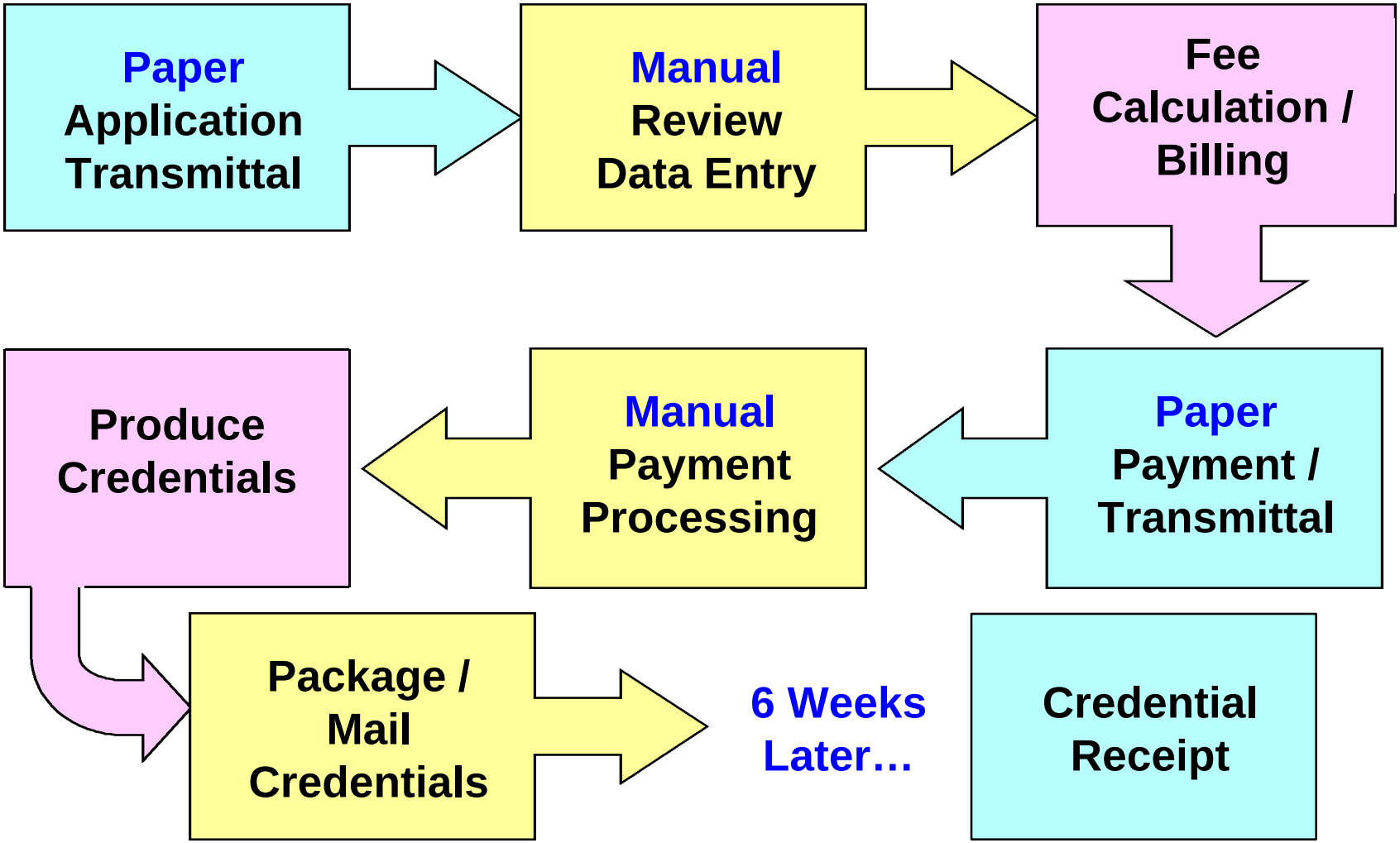
- Paperless Enforcement
- Data Access
- Standard Snapshots
- Flexible Implementation

Key Concepts (cont.)

- **Standard snapshots and reports for Carrier, Vehicle, and Driver Information** - Information exchange will be enabled through the use of standards. Many elements of CVO require information about the current and past safety performance and credentials status for carriers, vehicles, and drivers. Collecting the most-used information into standard messages will simplify systems since interfaces can be defined once, rather than negotiated between every pair of stakeholders.

- **Flexible implementation/deployment options** - The ITS/CVO architecture will accommodate existing and near-term communications technologies. Both government and industry will choose from a broad range of options, open to competitive markets, in CVO technologies.

Credentialing – Now

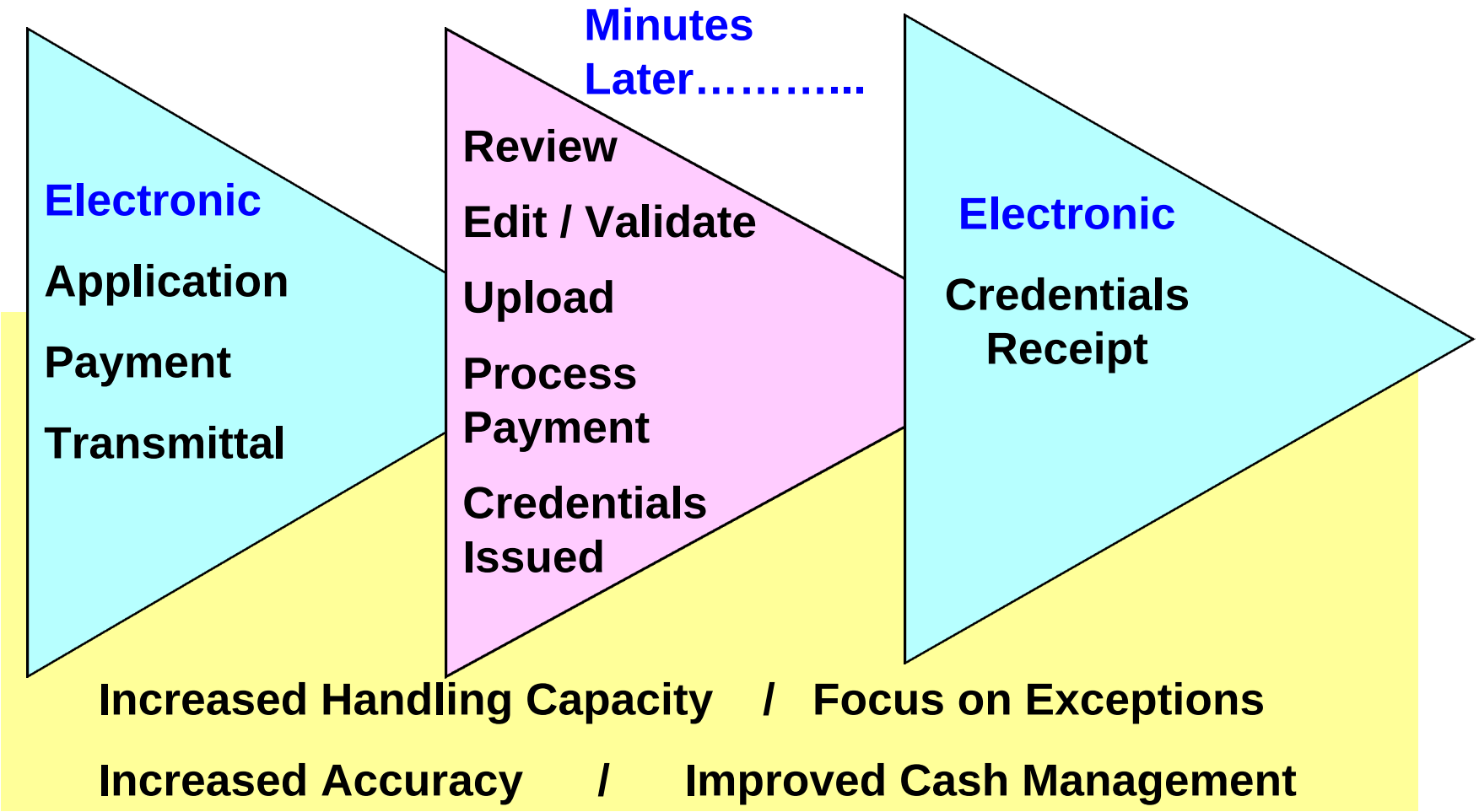


Credentialing – Now

Credentialing is a complex process for states and carriers alike:

1. Currently, the motor carrier or its agent completes a paper application form and attaches paper copies of all required supporting documents.
2. The paper application is mailed or hand delivered to the state.
3. State agency personnel manually review the application and its attachments. If errors or omissions are found, the state may call the carrier to correct, or may mail the form back to the carrier for correction / resubmittal.
4. Once the application has been verified, application data is manually entered into the state's legacy system.
5. The system calculates the required fees and prints a bill, which is mailed out to the carrier.
6 The carrier, upon receipt of the bill, mails payment back to the state.
7. The state manually processes the check, and enters payment data into the legacy system.
8. The system then prints a cab card at the state agency location, and the state packages the cab card, plates, stickers, etc. and mails these back to the carrier.
9. Six weeks or more from the date of original application receipt by the state, the carrier receives the credentials.

Electronic Credentialing



Electronic Credentialing (cont.)

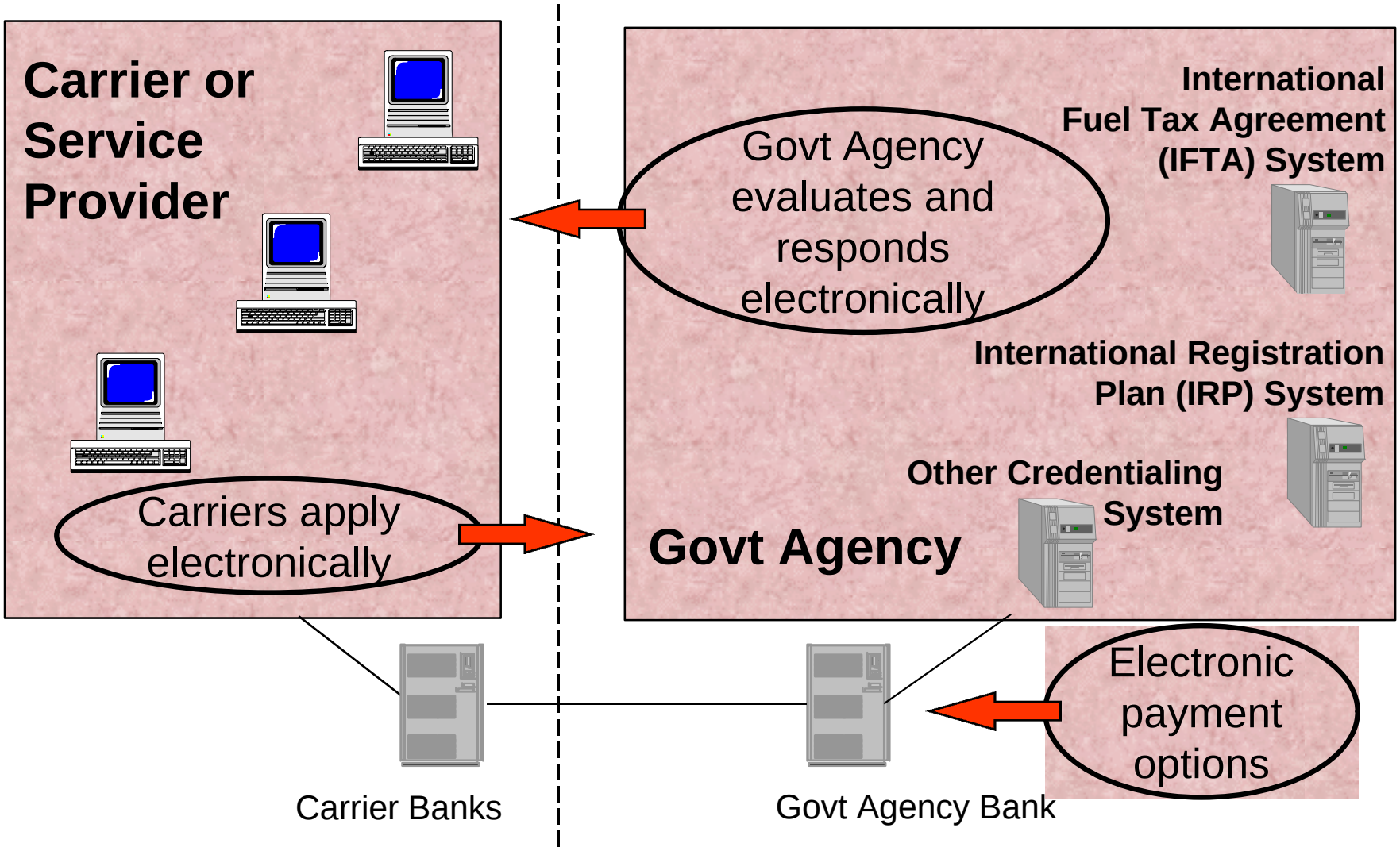
Electronic credentialing simplifies and speeds up the process for the state and carriers:

1. All of the same functions are performed, but the electronic credentialing system performs many of the routine functions that the state previously performed.
2. The carrier prepares the application electronically.
3. The automated credentialing system reviews the application for completeness and conformity with state requirements, and submits the application.
4. The automated system calculates the fee upon receipt of the application and immediately notifies the carrier of payment due.
5. The payment can be immediately submitted electronically.
6. The system can issue the credential back to the carrier in minutes rather than weeks.

Benefits:

- The system increases states' application handling capacity without increasing staff
- It allows state staff to focus on exceptions rather than the routine
- Stateside data entry requirements are eliminated and accuracy is improved
- Cash management is improved
- Carriers have 24 hour a day, seven day a week access to credentialing services
- The turn-around time to get vehicles on the road is reduced significantly

Electronic Credentialing (cont.)



What is Electronic Credentialing?

"Electronic credentialing" is an operational process that uses software under the applicant's control to send credentials applications and fuel tax returns to a government agency, and to get electronic notification of credentials status in return. When feasible, the credential itself is returned electronically. Electronic payment is normally associated with electronic credentialing.

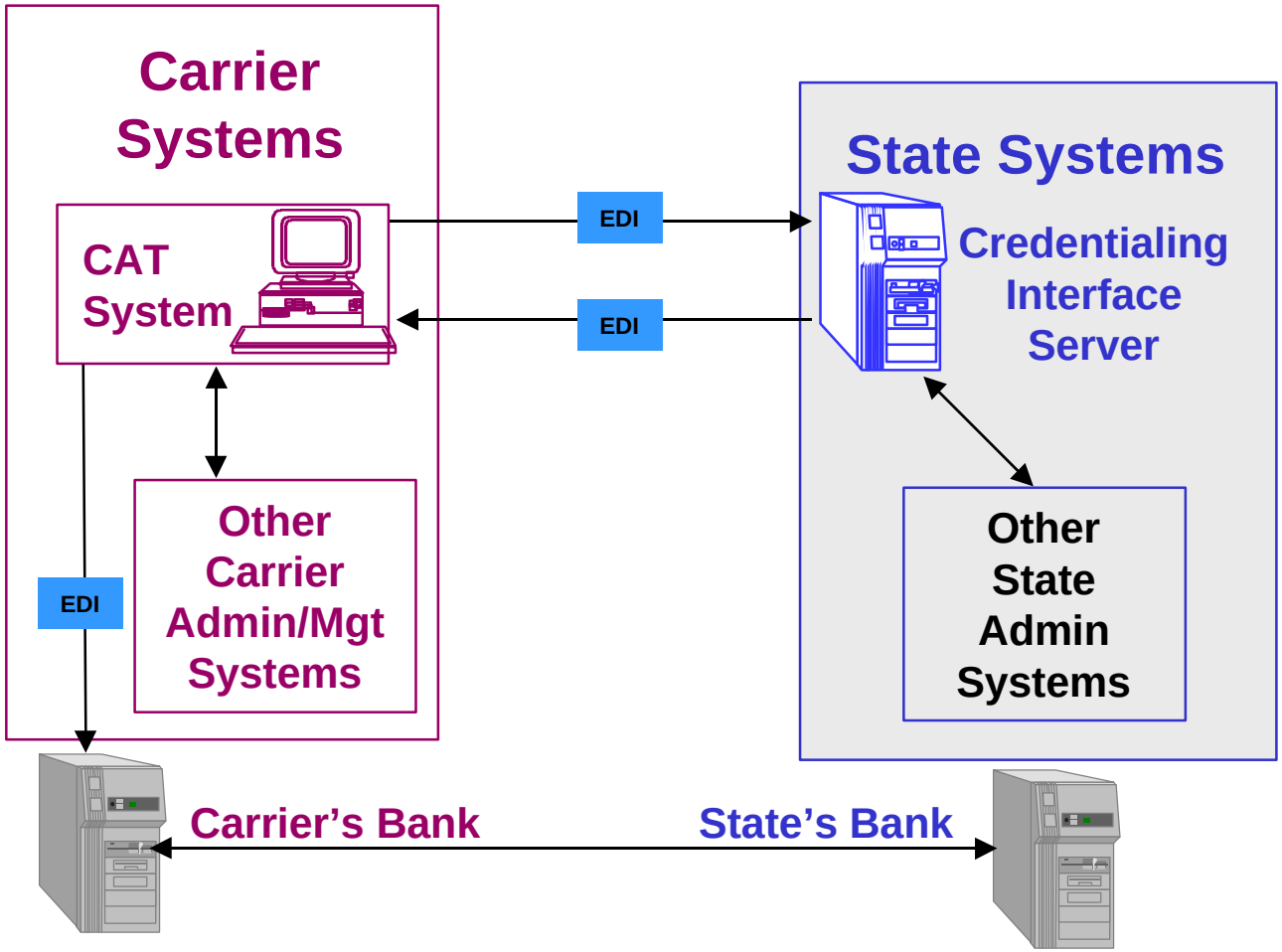
Several electronic credentialing options are being explored by CVISN prototype and pilot states. Many states are planning to try more than one option.

Since the use of open standards is a key architectural concept, it is important that states provide some electronic credentialing option that supports the use of EDI X12 transactions.

Note: Most credentials are issued by state agencies, sometimes acting on behalf of the Federal government.

Carrier Automated Transactions (CAT) Software

The CAT is one way for carriers to apply for and receive credentials electronically



CAT Software

The Carrier Automated Transactions software performs these functions:

- Data entry screens for credential applications & fuel tax filing
- Validate application
- Specify payment method
- Compute fees due (some, not all)
- Translate to/from EDI transaction
- Print credentials
- Initiate payments through banks (future)
- Send EDI transactions
- Receive EDI transactions
- Acknowledge EDI transactions
- Print applications
- Record transactions

Some carriers may choose to use a service provider to handle electronic credentialing.

CAT Software Demonstration

- This demonstration will illustrate how electronic credentialing could look from the carrier's side.

- Other implementation choices are also possible, depending on what services are available to the carrier commercially, and from the state.
  - the carrier may use a service bureau to handle credentialing, or
  - the state may provide a web page for credentialing, or
  - _____.

Notes

Interagency Data Exchange

- What agencies within your state are interested in credential status or payment history information?
- How would they use this information?
- Resources for interagency data exchange:
  - CVIEW / SAFER
  - COVE / MAPS Model
  - Other Models

Notes

Interstate Data Exchange

Existing Base State Agreements

- International Registration Plan (IRP)
- International Fuel Tax Agreement (IFTA)

Other Interstate Data Exchange

- Single State Registration System (SSRS)
- Multi-State Oversize / Overweight Permits
- SAFER Data Mailbox (Credentials Check Flag)

Interstate Data Exchange (cont.)

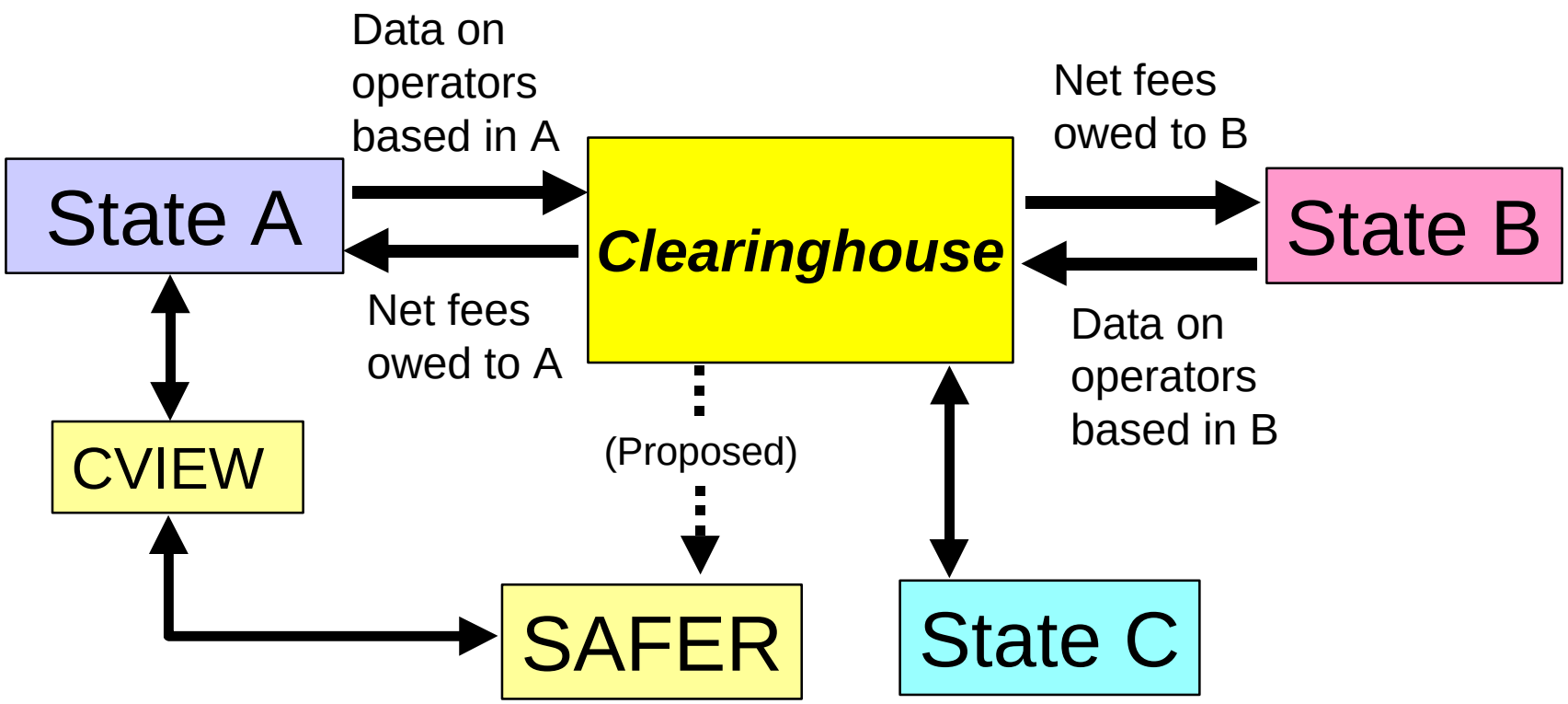
With apportioned registrations such as IRP, IFTA and SSRS, the applicant files with a “base state” and that state collects fees for all states in which the applicant will operate. The base state agrees to send apportioned fees to other states.

Clearinghouses have been identified to assist with implementation of these base state agreements for IRP (established clearinghouse) and IFTA (clearinghouse under development).

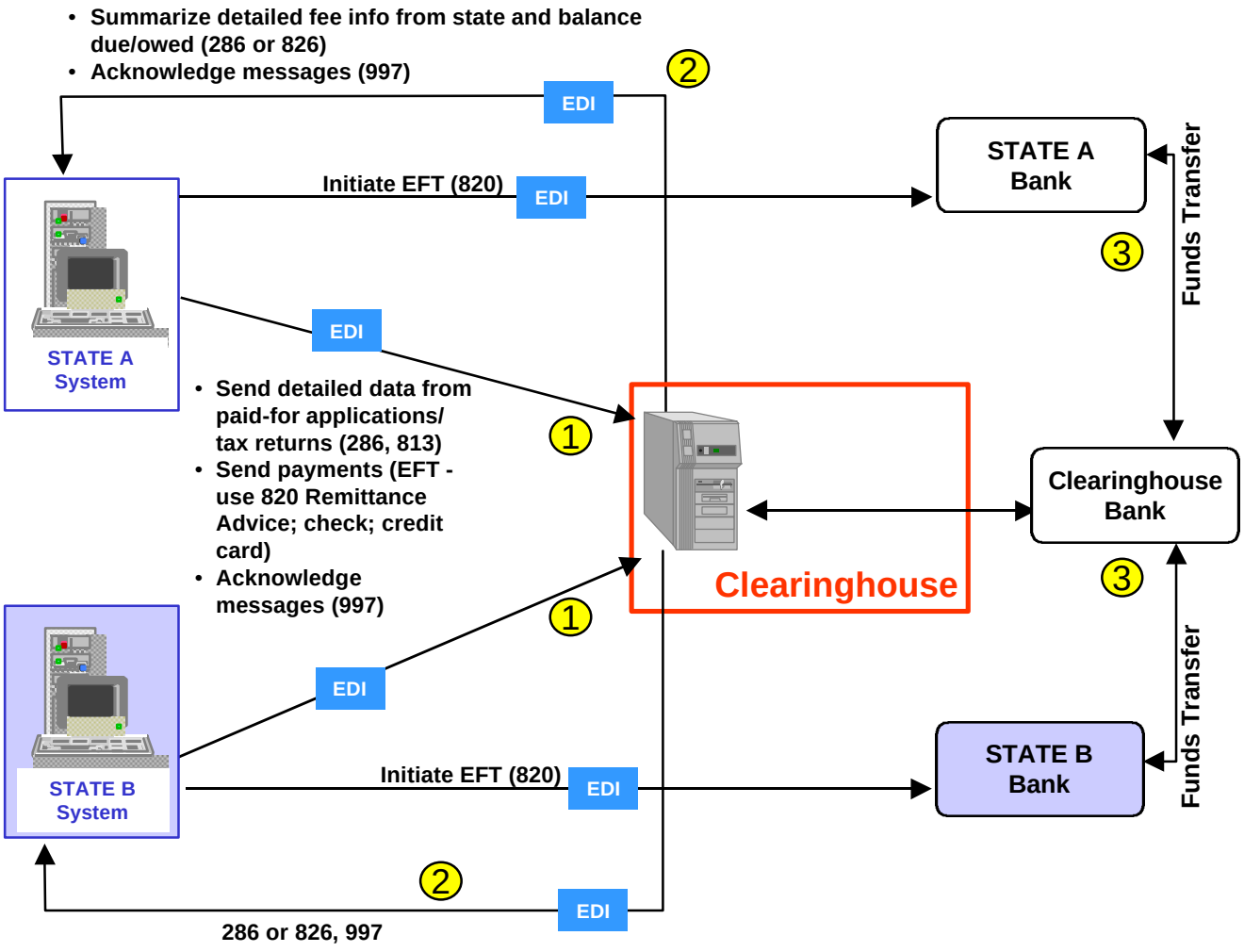
Other areas where states have a need to exchange data include SSRS transmittals and fees, transmittals and fees related to WASHTO and SASHTO regional permits and out of service violation information.

Clearinghouses

Support State-to-State Information and Fee Transfer



Clearinghouses (cont.)

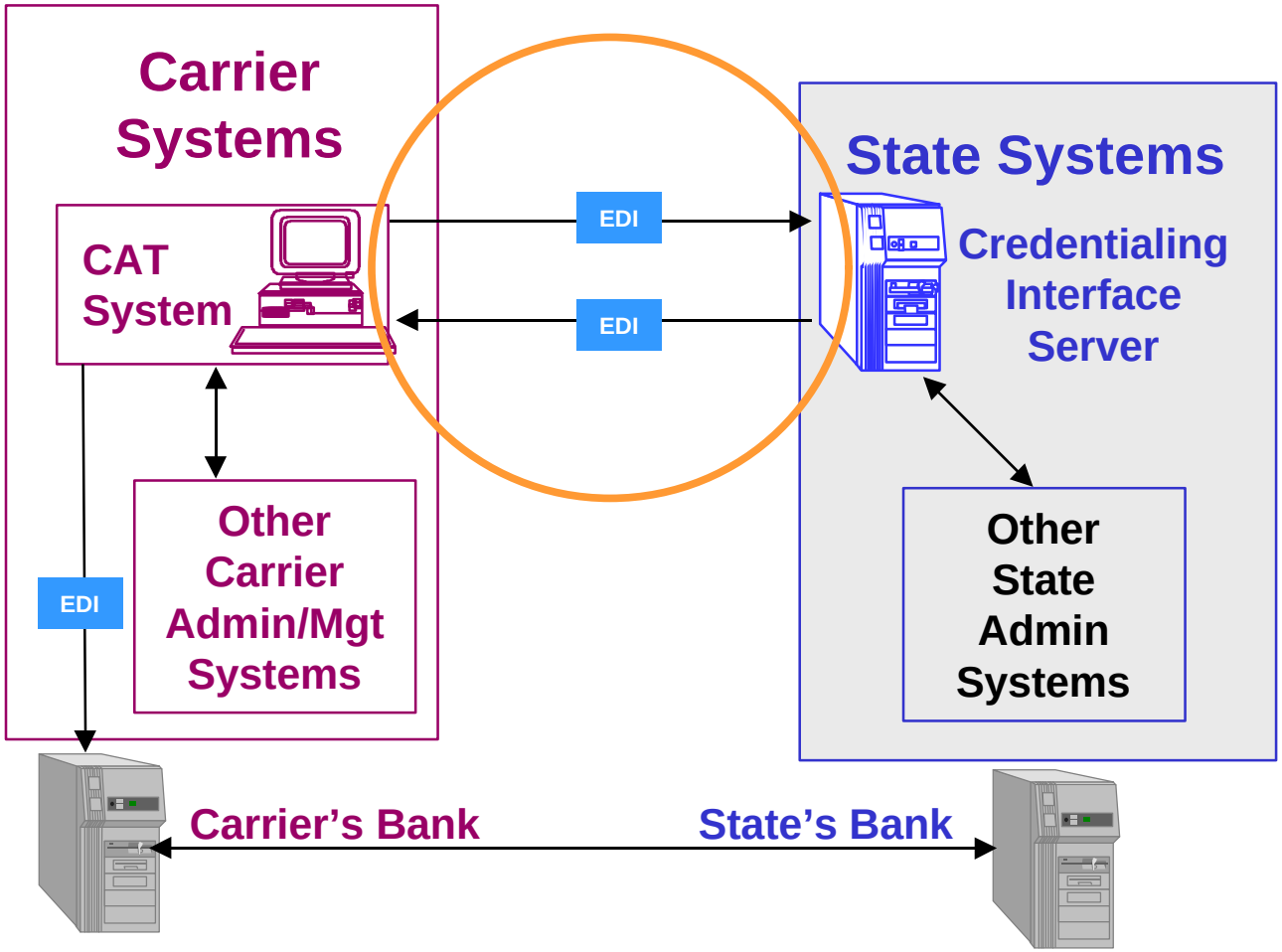


A clearinghouse processes information received electronically from states to compute fees due/owed each jurisdiction, and facilitates periodic funds transfers.

A clearinghouse should perform these major functions:

1. Accept detailed data input from jurisdictions;
2. Compute balance due/owed to/from each jurisdiction;
3. Facilitate periodic funds transfer, supporting EFT.

Enabling Technologies



Enabling Technologies

- Standardized Interfaces
  - Common language
  - Allow different systems to communicate

- *What is an "open" standard?*

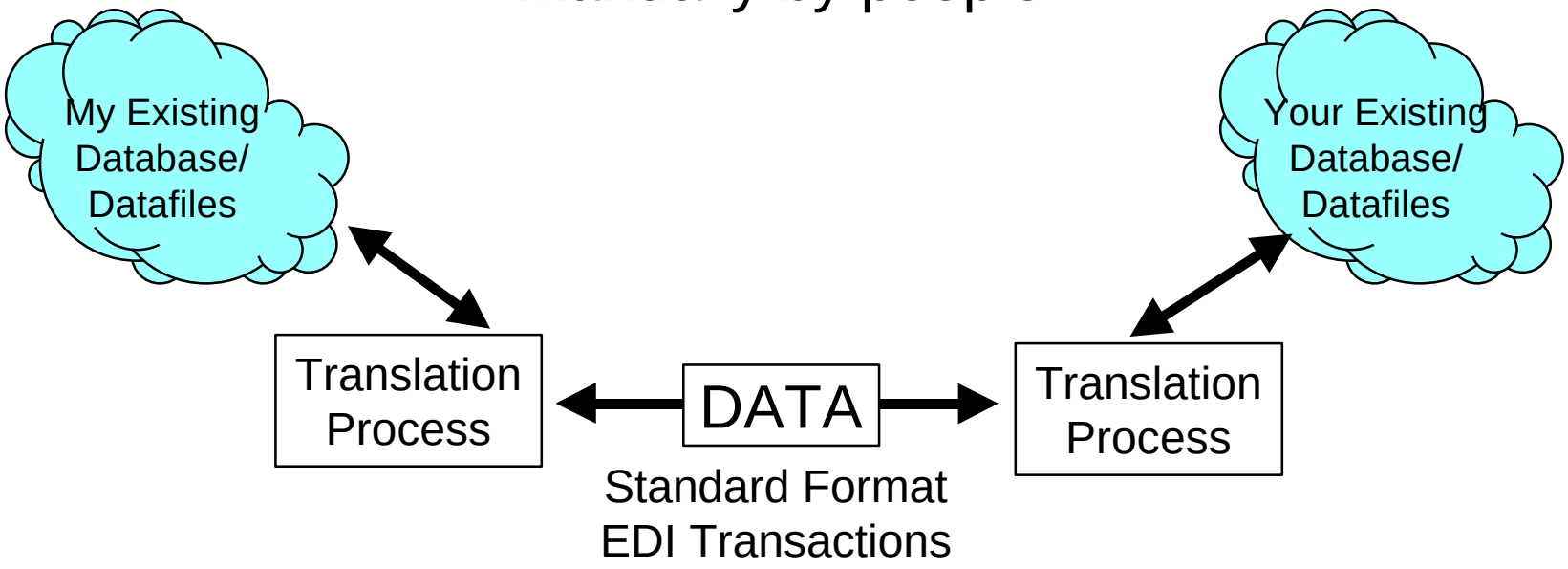
  One that is published in publicly available documents. Any vendor, developer, private individual can create an application that uses an open standard.

- In Commercial Vehicle Operations, the need for two types of standardized data interfaces has been identified to ensure interoperability:

  - Between the roadside or fleet management center and the commercial vehicle, Dedicated Short Range Communications (DSRC) (will be covered in Module 5).
  - Between trading partners for computer-to-computer interchange, Electronic Data Interchange (EDI). The American National Standards Institute (ANSI) is the standards development organization involved with the CVO EDI transactions.

Electronic Data Interchange (EDI)

EDI uses open standards to exchange information. Information transmitted in EDI transactions is organized to be processed automatically by computers, rather than manually by people.

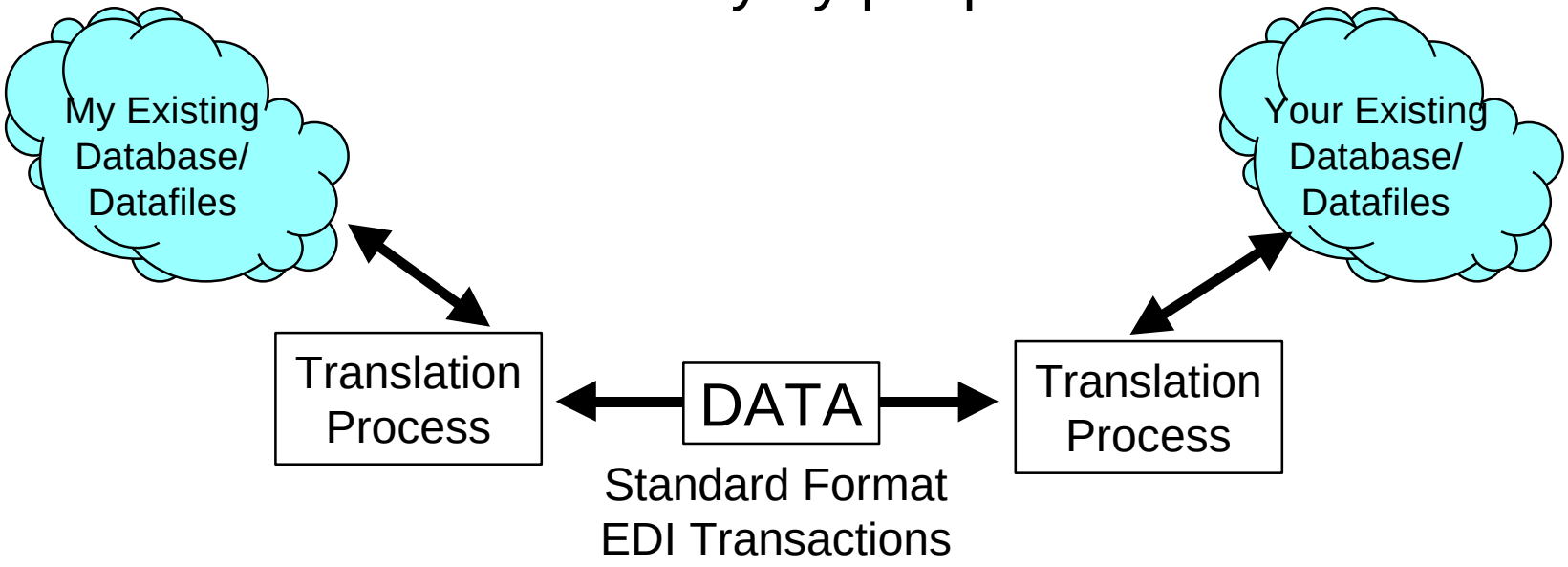


What Is EDI?

- Electronic Data Interchange (EDI) is the electronic exchange of business information in a format that permits *computer generation and processing* of the message
  - Reduces or eliminates paper transactions
  - Promotes *AUTOMATED* processing & storing of data
- EDI is transmitted as text data files, and so can be exchanged using almost any communications network and protocol
- EDI *standards* and *user implementation guides* define the structure and meaning of messages passed between trading partners
- A common implementation is to couple existing systems to an EDI *translator software* package & a commercial network

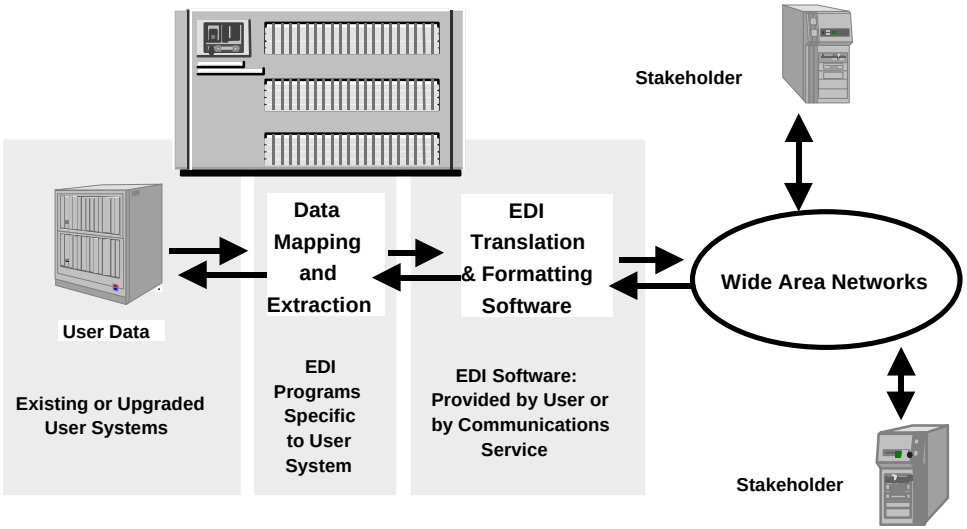
Electronic Data Interchange (EDI)

EDI uses open standards to exchange information. Information transmitted in EDI transactions is organized to be processed automatically by computers, rather than manually by people.



Why Use EDI?

- Allows *automatic* message generation, processing and response. *End user* system can preprocess and filter messages according to that user's particular requirements
- Largely system independent
- Already has considerable support and use in the transportation industry
- Supported by readily available commercial products
- Multiple communication options
- The American National Standards Institute (ANSI) provides an infrastructure for defining & maintaining open EDI standards



Current Deployment Activities

- Electronic Credentialing
- Interagency Data Transfer / Accessibility
- Clearinghouses / Interstate Data Transfer

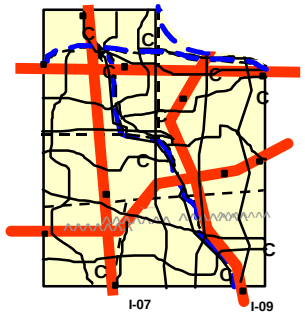
Current Deployment Activities (cont.)

Carriers are beginning to implement **Electronic Credentialing** software such as the Carrier Automated Transaction (CAT) to send credentials applications and fuel tax returns to the appropriate jurisdiction, and to get electronic notification of credentials status in return.

The CVIEW system is being developed in many CVISN States to support **Interagency Data Transfer**.

SAFER supports **Interstate Data Transfer** of snapshots. States will join the clearinghouses for **Interstate Data Transfer** to reduce the costs of supporting base state agreements.

Midland – Credentials Administration



Issues:

- Increased demand / flat budget
- Carriers dissatisfied with turn-around time

Specific Objectives:

- Reduce turn-around time for credential issuance
- Increase state processing capacity without increasing staff
- Reduce the costs of supporting the IRP and IFTA base state agreements

Response:

- Electronic Credentialing
- Clearinghouse Participation

Midland's Thought Processes:

Why electronic credentialing?

- Midland really wants to accomplish two things:
  - Automate the processing of applications for CV credentials, to avoid increasing staff levels to deal with the increased workload attributed to the increased numbers of carriers, vehicles, and drivers
  - Improve services for carriers, vehicle registrants, and drivers

How did those goals lead to the electronic credentialing conclusion?

- CV operators are pressuring state to allow for electronic applications/tax filing and electronic credentials
- CV operators want a variety of options: via own computer, via service provider, via walk-up kiosk
- If an application/tax return is made electronically, it should be possible to process it electronically

So . . . electronic credentialing is a good solution?

- Allows CV operator to apply for and receive different credentials using a uniform electronic approach
- Software can be built to retrieve data from the applicant's own database, or to stand alone

To reduce the costs of supporting the IFTA and IRP base state agreements, Midland will join the IRP and the IFTA Clearinghouses.

- More automated processing and less manual processing
- More timely netting and fee reconciliation
- Avoid having to make electronic interface agreements with all states

Assessment

How can Intelligent Transportation Systems improve Commercial Vehicle Credentials Administration?

Please form small groups and address these questions:

1. What credentials should Midland, or your state, start with? Why?

2. Which agencies should begin sharing data within the state? What systems / capabilities is the ITS / CVO program developing that could help in this interagency data sharing?

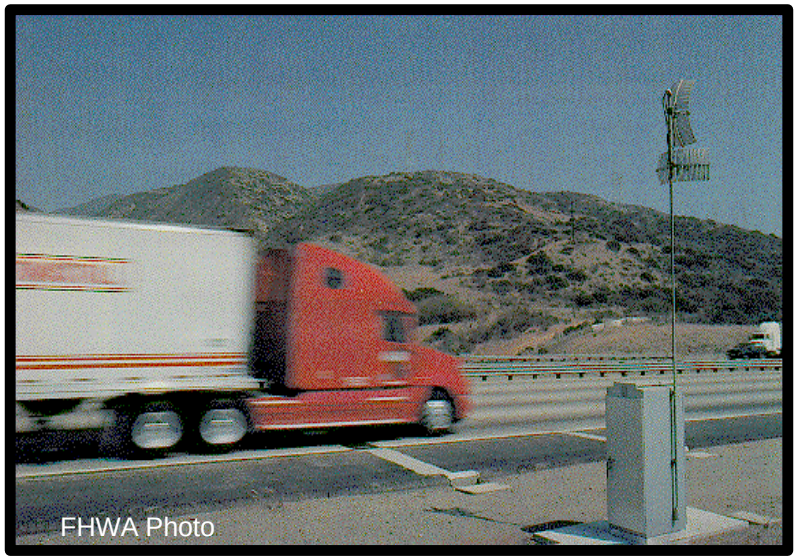
Notes

Recap & Questions

Module Objectives:

- Define Current CVO Credentialing Processes
- Identify Purpose / Benefits of Electronic Credentialing
- Identify Technologies to Enable Electronic Credentialing
  - Credentialing Systems
  - EDI
  - Open Standards
- Define Interagency Data Transfer
- Define Interstate Data Transfer

Any Questions?



MODULE 5

ITS/CVO Program Areas: Electronic Screening

US Dept of Transportation

Electronic Screening

Program Areas

Electronic Screening	Carrier Operations
• Automated weight and credentials screening • International electronic border clearance	• Fleet and vehicle management • Traveler information systems • Hazardous Materials incident response

CVISN Architecture (Technical Infrastructure)

Mainstreaming and Deployment Planning (Organizational Infrastructure)

Learning Objectives

Participants will be able to:

- **Define** electronic screening
- **Describe** how Weigh In Motion (WIM) and Dedicated Short-Range Communications (DSRC) support electronic screening
- **Identify** electronic screening systems
- **Describe** International Border Clearance (IBC) and other DSRC operations
- **Relate** electronic screening operations to Midland

Module Structure

- Electronic Screening
- Technology: Weigh in Motion (WIM)
- Technology: Dedicated Short Range Communications (DSRC)
- International Border Clearance (IBC) and other DSRC applications
- Electronic Screening in Midland
- Summary

Notes

Electronic Screening Definitions

- Screening: Selection mechanism to target high risk operators and make efficient use of weigh station and inspection resources

FHWA Photo

Photo Courtesy of Hunter Engineering Company

- Electronic Screening: Application of technology to make more informed screening decisions

Electronic Screening Definitions

- **Screening**, applied to commercial vehicles, is a selection mechanism to make efficient use of limited fixed weigh station and inspection resources.

- **Electronic Screening** is the application of technology to this process, in order to make an informed decision about whether further examination of a vehicle is required. Properly implemented, Electronic Screening results in improved traffic flow, focused vehicle inspections and ultimately achieves the goals of increased safety and reduced operating costs.

The Electronic Screening capability area provides for:

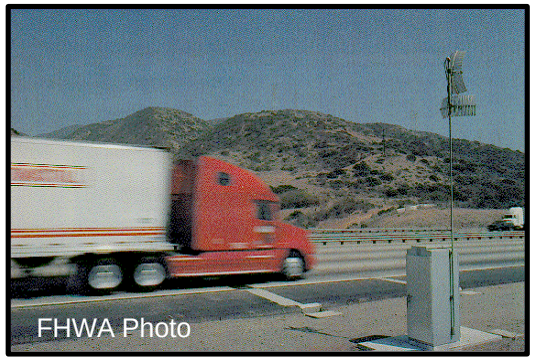
- Screening vehicles that pass a roadside check station based on identifiers read from the transponder, correlated with safety and credentials information from snapshots
- Determining whether further inspection or verification of credentials is required & taking appropriate actions.

Screening Factors Categories

- Safety
  - History
  - Current condition

- Credentials
  - Taxes & fees
  - Permits, licenses, papers

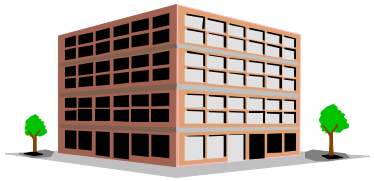
- Size & Weight
  - Within legal or permitted limits



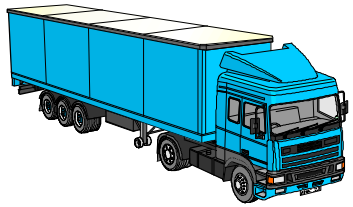
Notes

Screening Factors Record Types

- Carrier



- Vehicle



- Driver

  (Future, Optionally)

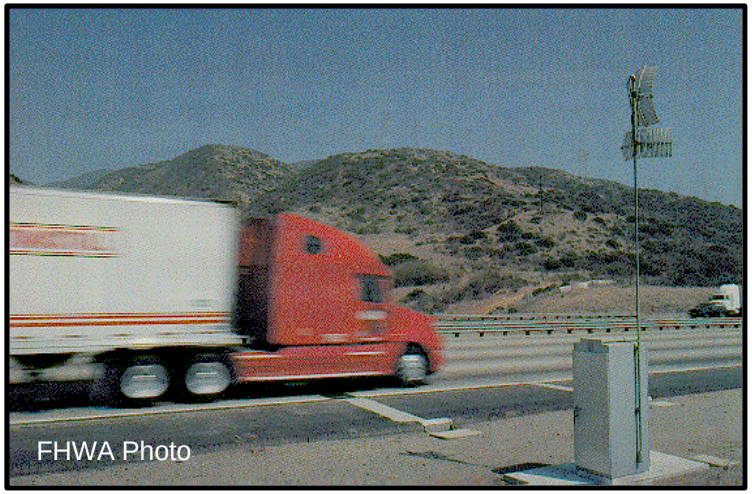
Snapshots: Packets of Safety Data at the Roadside

Data → / Snapshot ↓	Identifier/Census Data	Safety Information	Credential Information
Carrier	[1]Carrier Unique ID; Other IDs (e.g., ICC, DUNS, IRP account, etc.); Names; Addresses; Operations Characterization	Safety Ratings; Accident, Inspection, & Violation Summaries; Safety Review History; [1]Last OOS	Carrier Registration; Equivalent of IFTA Decal; [1] Financial Responsibility; HazMat Registration; [1] Permit Data; Base State(s) [2] Optionally, Carrier Check Flags (e.g., IRP & IFTA Flags)
Vehicle	[1] VIN; [1] Base State; Other IDs (e.g., Plate, IRP Account, CVIS Default Carrier, Transponder); Vehicle Description	Last Inspection Overview; Inspection & Violation Summaries; [1] Last OOS CVSA Decal Exp Date	Apportionment (i.e. Cab Card Data); [1] Permit Data [2] Optionally, Vehicle Check Flags (e.g., NMVTIS Check Flag, Registration Check Flag)

Notes: 1 = Data are current; all other data are historical; 2 = State may store in CVIEW or may request SAFER to store

Weigh in Motion (WIM)

- Weigh vehicles while moving
  - From slow to highway speed
- Estimates axle weights and gross vehicle weight
  - Not as accurate as static scale



Weigh in Motion (WIM)

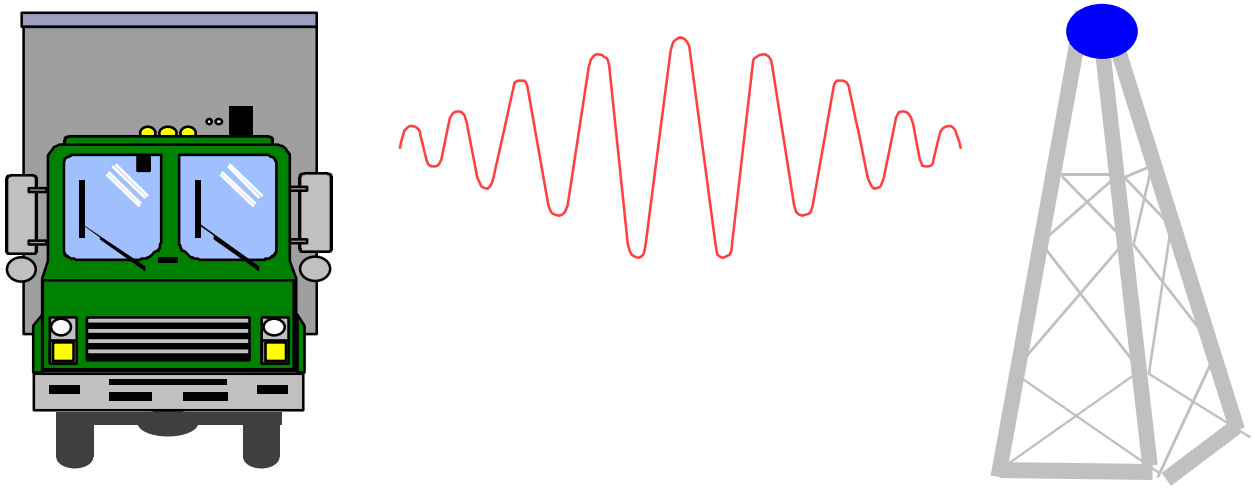
- *Weigh In Motion (WIM):* Weigh In Motion is used to measure approximate axle weights as a vehicle moves across the sensors, and to determine the overall vehicle weight and classification based on the axle weights and spacings. Although not as accurate as a static scale, WIM allows the weight of a vehicle to be estimated for screening purposes, while maintaining traffic flow. WIM is not required for weight enforcement.

- Various speeds have different purposes:
  - Mainline: Rough estimate of weight; determine if vehicle is significantly below limits
  - Ramp-sort: Better measure; determine whether to send to static scale or bypass lane
  - Slow rollover: Good measure but quicker than static scale

DSRC Definition

Dedicated Short Range Communications (DSRC):

- Wireless communications of data between a vehicle and roadside station
- Vehicle to Roadside Communications (VRC)
- Automatic Vehicle Identification (AVI)



DSRC Definition

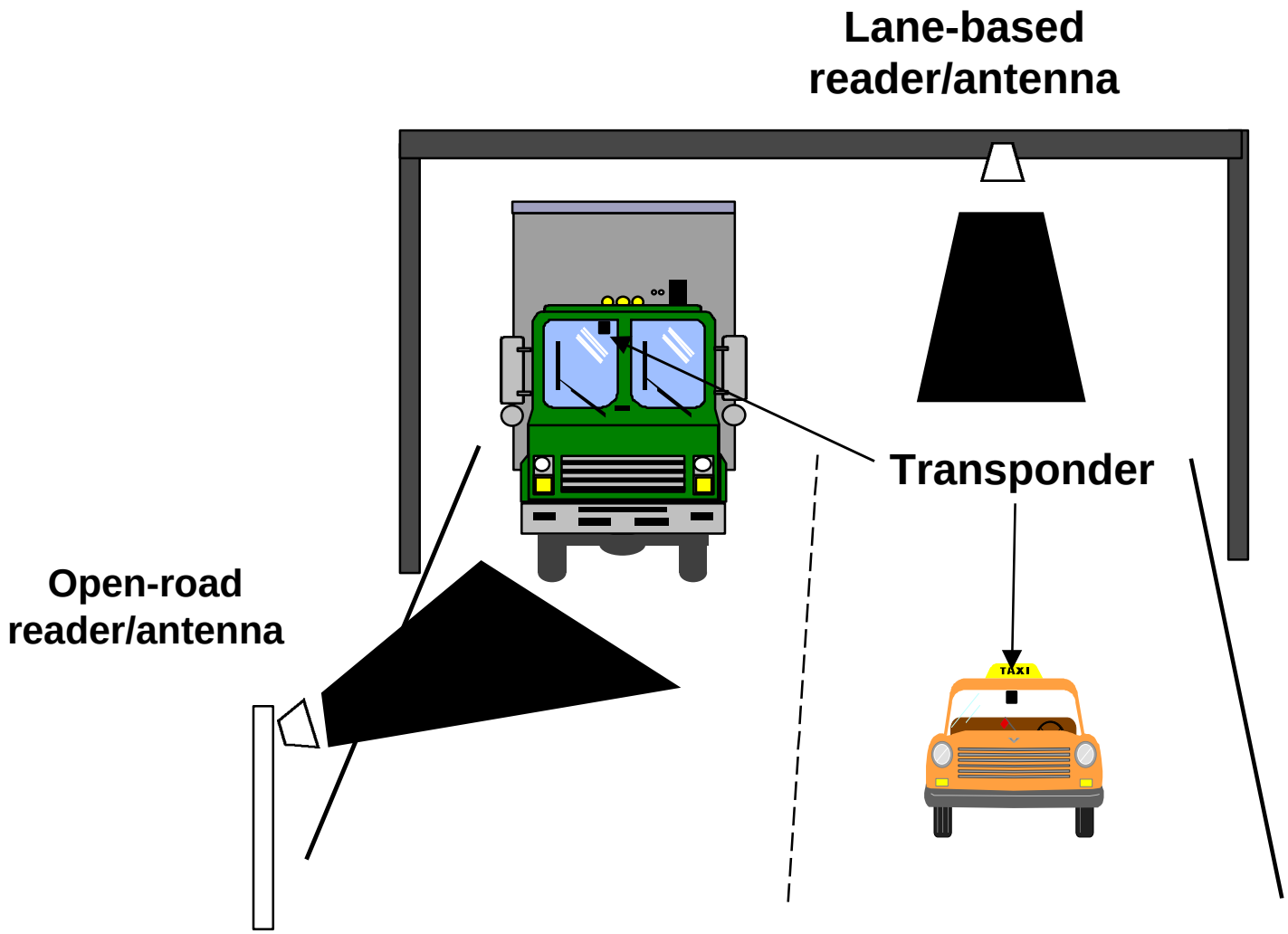
Dedicated Short Range Communications (DSRC):
DSRC is used to provide data communications between a moving vehicle and the roadside equipment to support the screening process. This is accomplished by means of a transponder (a.k.a... tag) mounted in the cab of the vehicle, and a reader and antenna installed at the roadside.

DSRC Components: Transponder

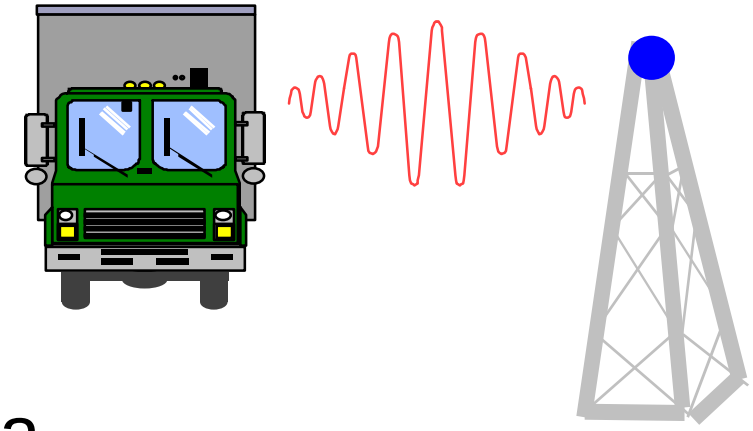
- Tag shown is Hughes Type III with following features:
  - Red, yellow and green LED indicators
  - Audible tone
  - 915 MHz
  - External port (RS-232)
  - 64 total bytes of memory
  - Approximate cost: $100 - $200

FHWA Photo

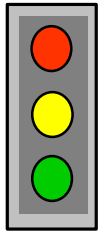
DSRC Components: Reader



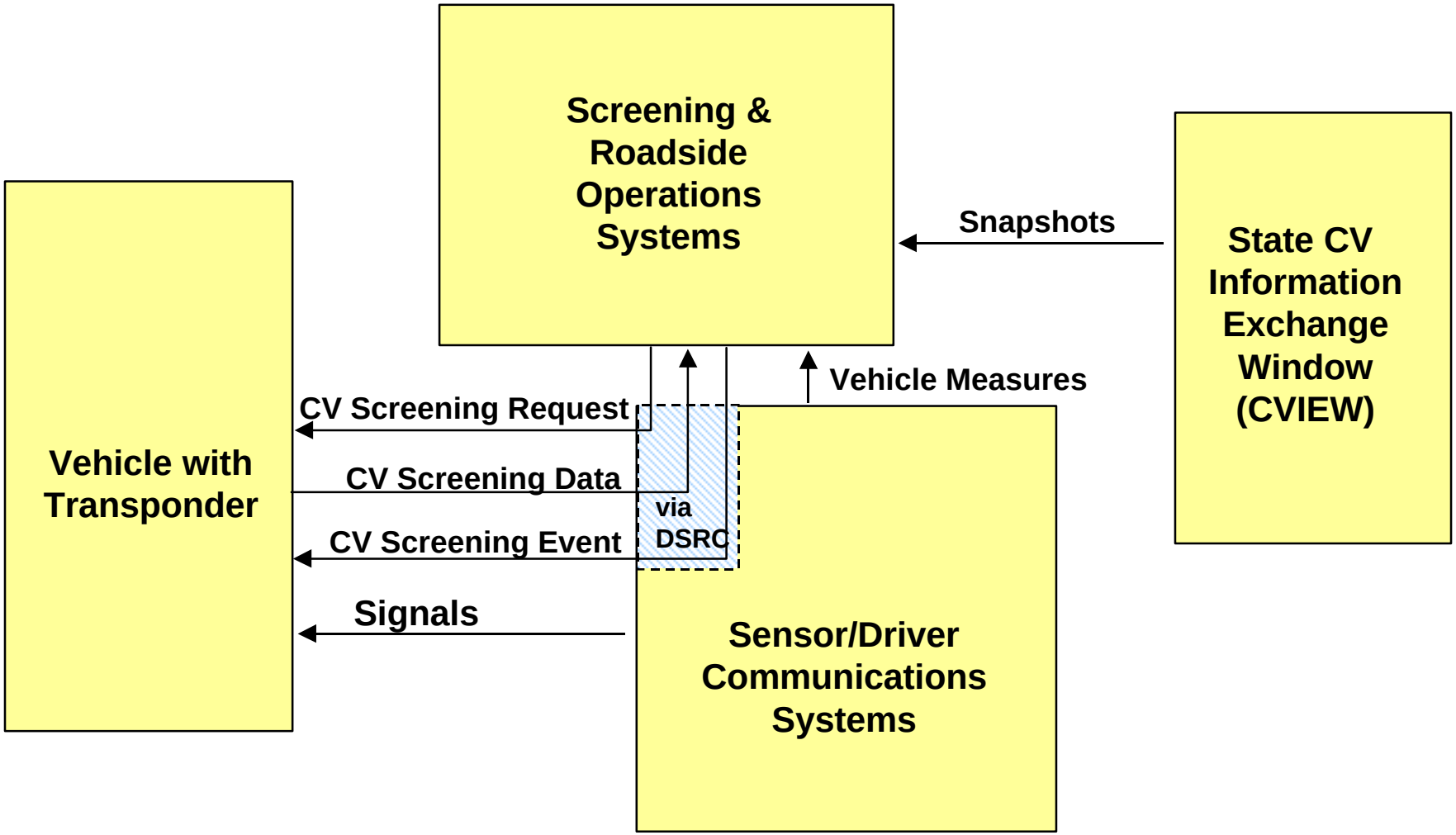
DSRC in Electronic Screening



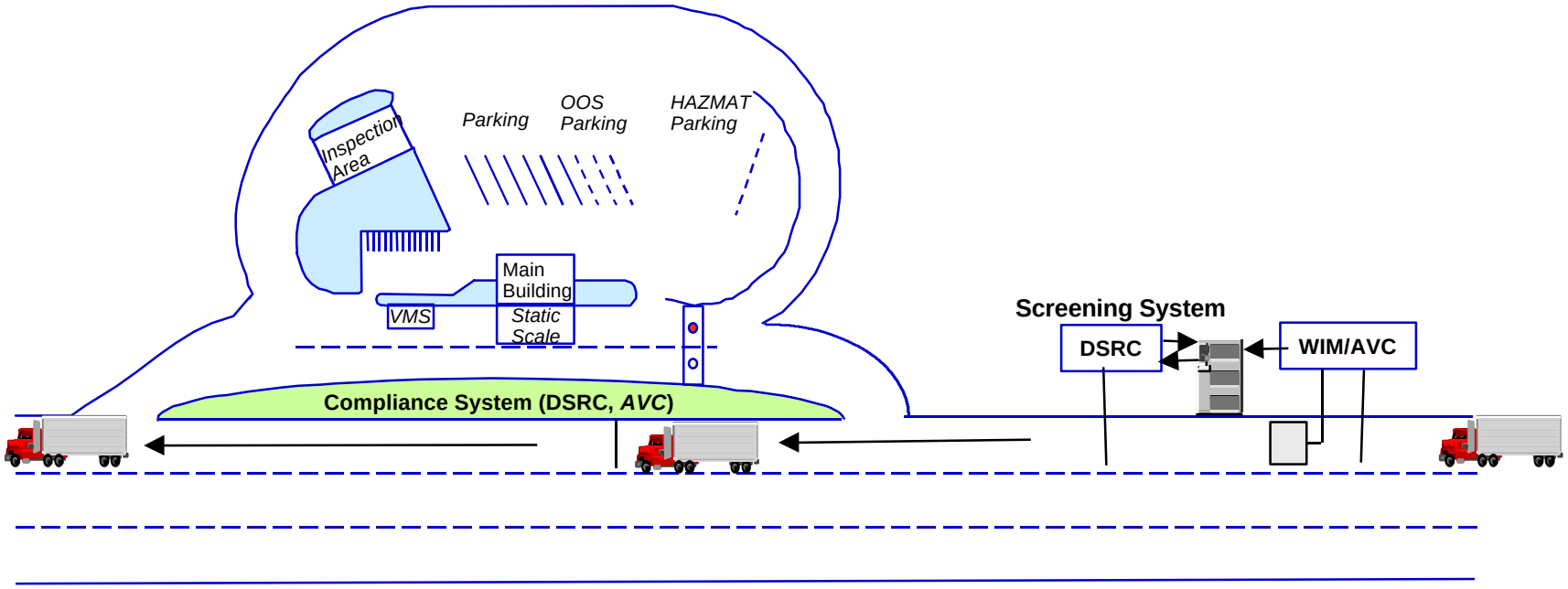
- Send Carrier/Vehicle/Driver identifiers
- Transfer other screening data
  - Previous screening event results
- Signal driver with pull-in decision



DSRC in Electronic Screening



Operational Scenario: Fixed Site



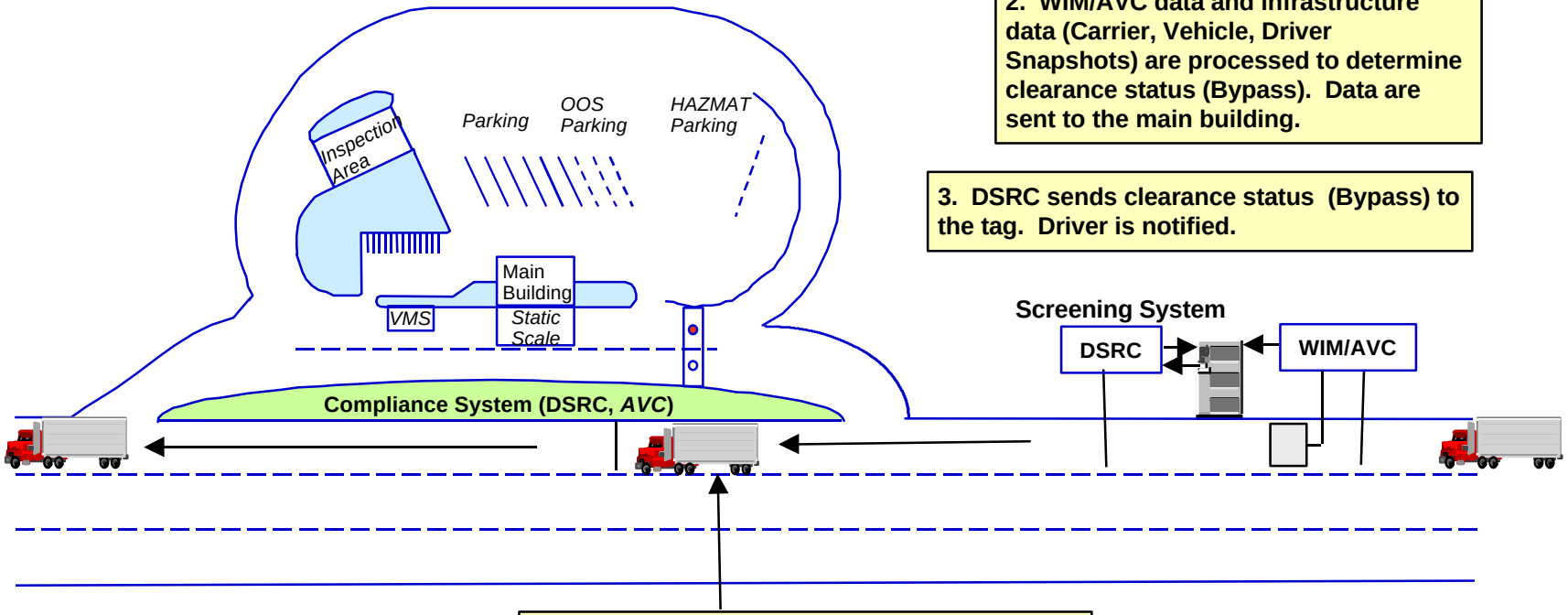
Operational Scenario: Fixed Site

1. Commercial vehicle approaches check station. Screening system identifies the carrier, vehicle, and driver; reads the last screening event from the tag; classifies the vehicle; and weighs the vehicle.

Acronyms
AVC - Automatic Vehicle Classification
DSRC - Dedicated Short Range Communication
WIM - Weigh In Motion
VMS - Variable Message Sign

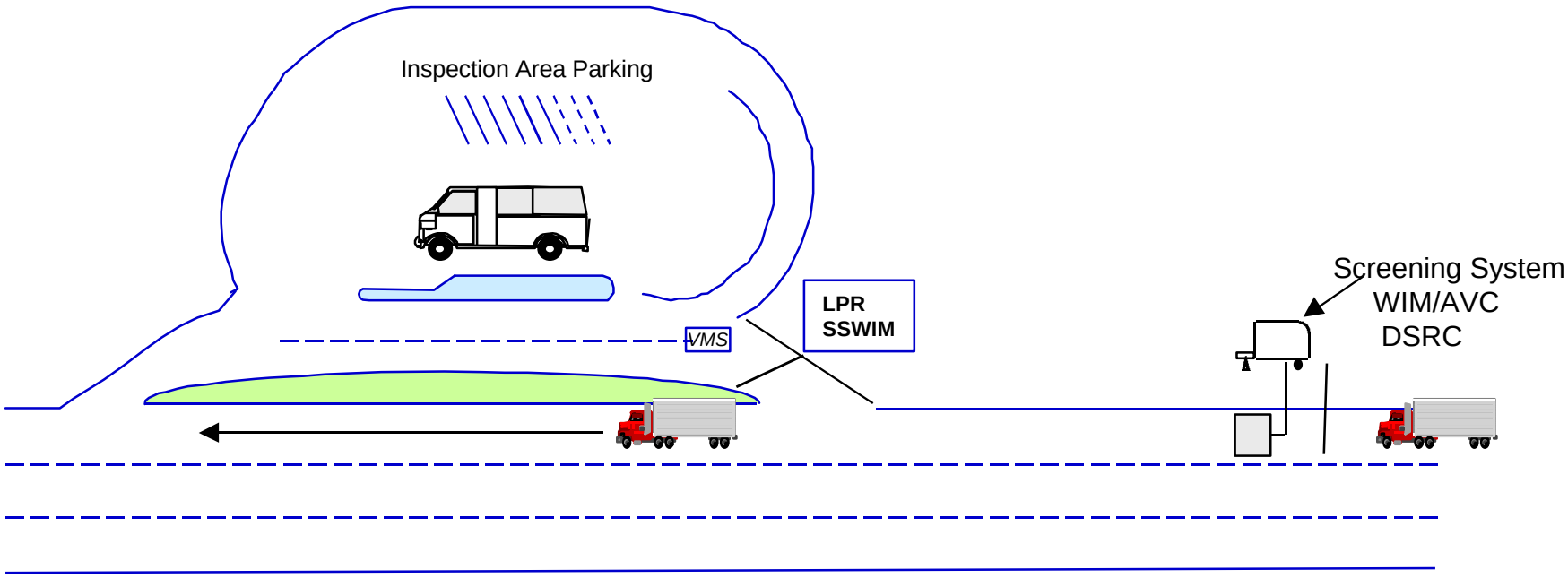
2. WIM/AVC data and infrastructure data (Carrier, Vehicle, Driver Snapshots) are processed to determine clearance status (Bypass). Data are sent to the main building.

3. DSRC sends clearance status (Bypass) to the tag. Driver is notified.



4. Compliance reader interrogates tag to verify vehicle has been cleared to Bypass.

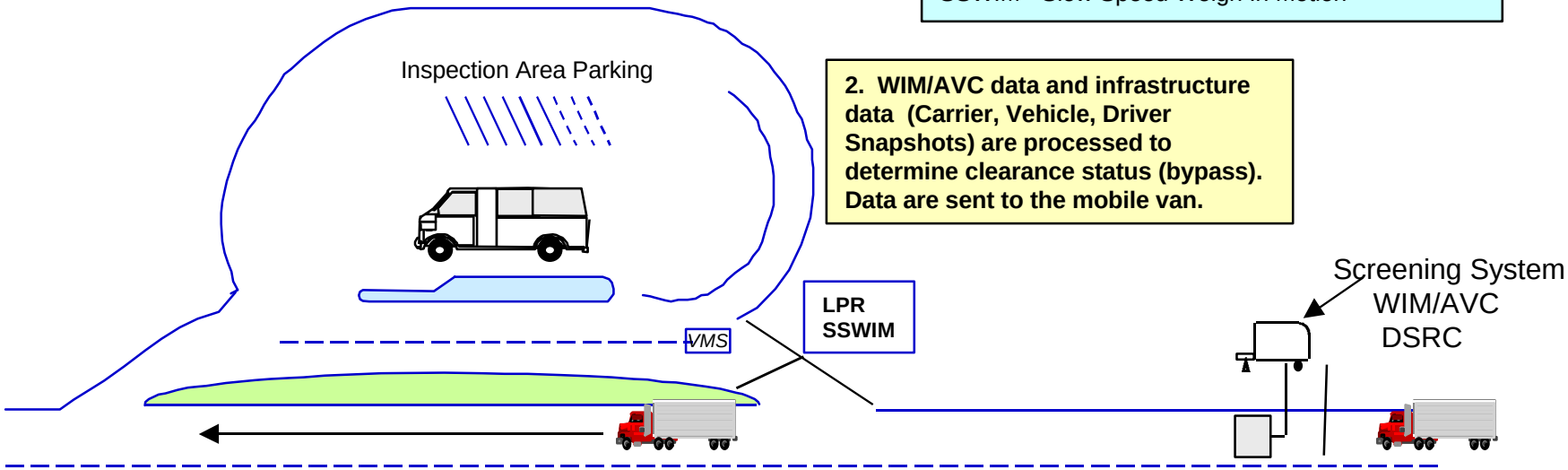
Operational Scenario: Mobile Site



Operational Scenario: Mobile Site

1. Vehicle approaches site where mobile unit is located. WIM/AVC determines vehicle gross weight, number of axles, axle weight, axle spacing. For a tagged vehicle, DSRC identifies carrier, vehicle, and driver.

Acronyms
AVC - Automatic Vehicle Classification
DSRC - Dedicated Short Range Communication
WIM - Weigh In Motion
LPR - License Plate Reader
SSWIM - Slow Speed Weigh In Motion

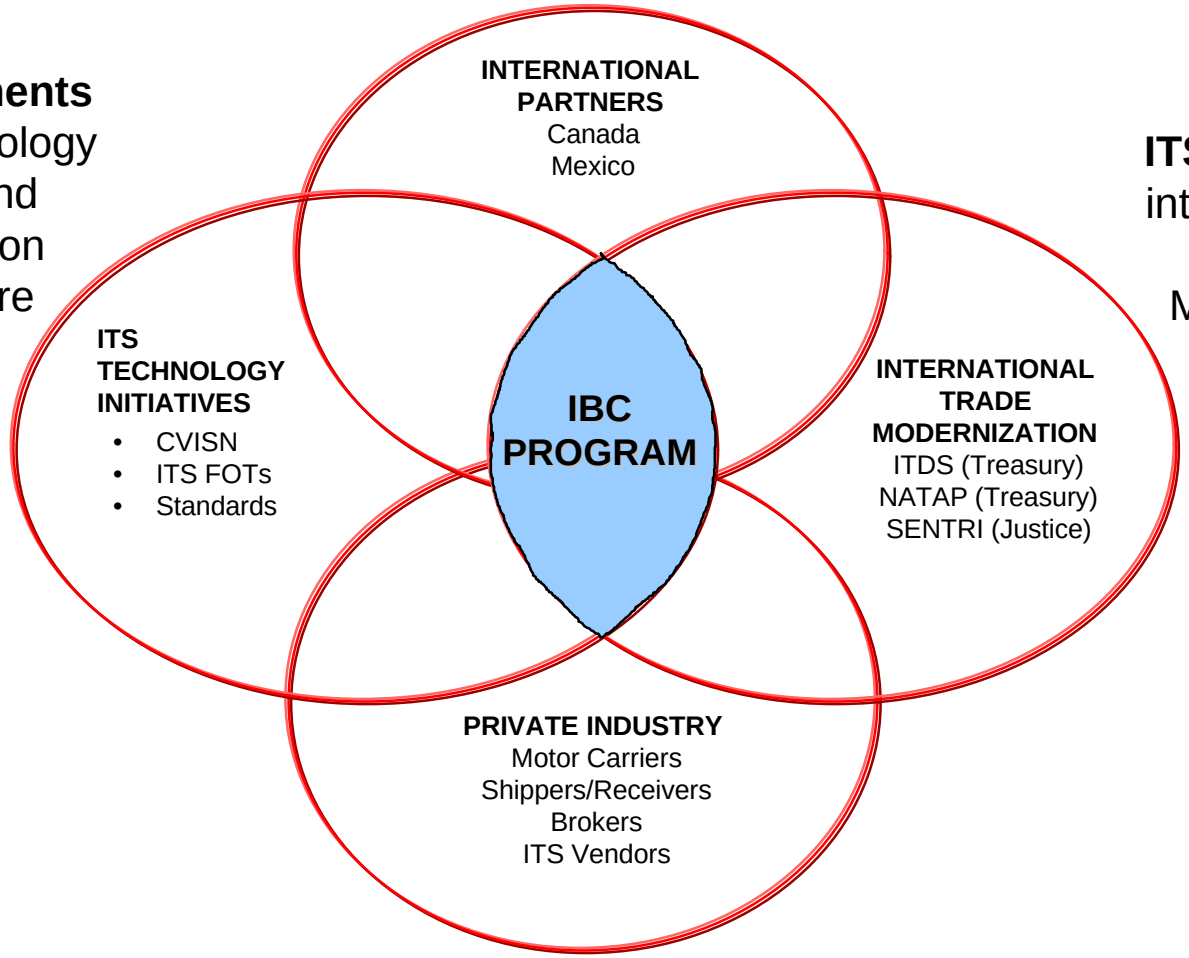


2. WIM/AVC data and infrastructure data (Carrier, Vehicle, Driver Snapshots) are processed to determine clearance status (bypass). Data are sent to the mobile van.

3. DSRC sends clearance status (Bypass) to the tag. Driver is notified. Cleared vehicles are permitted to continue without any delay.

IBC Program Balances DOT Safety Mission and Facilitating International Trade

Integrate
IBC Requirements
into ITS Technology Initiatives and Transportation Infrastructure



Integrate
ITS Technology
into International Trade Modernization

International Border Clearance (IBC)

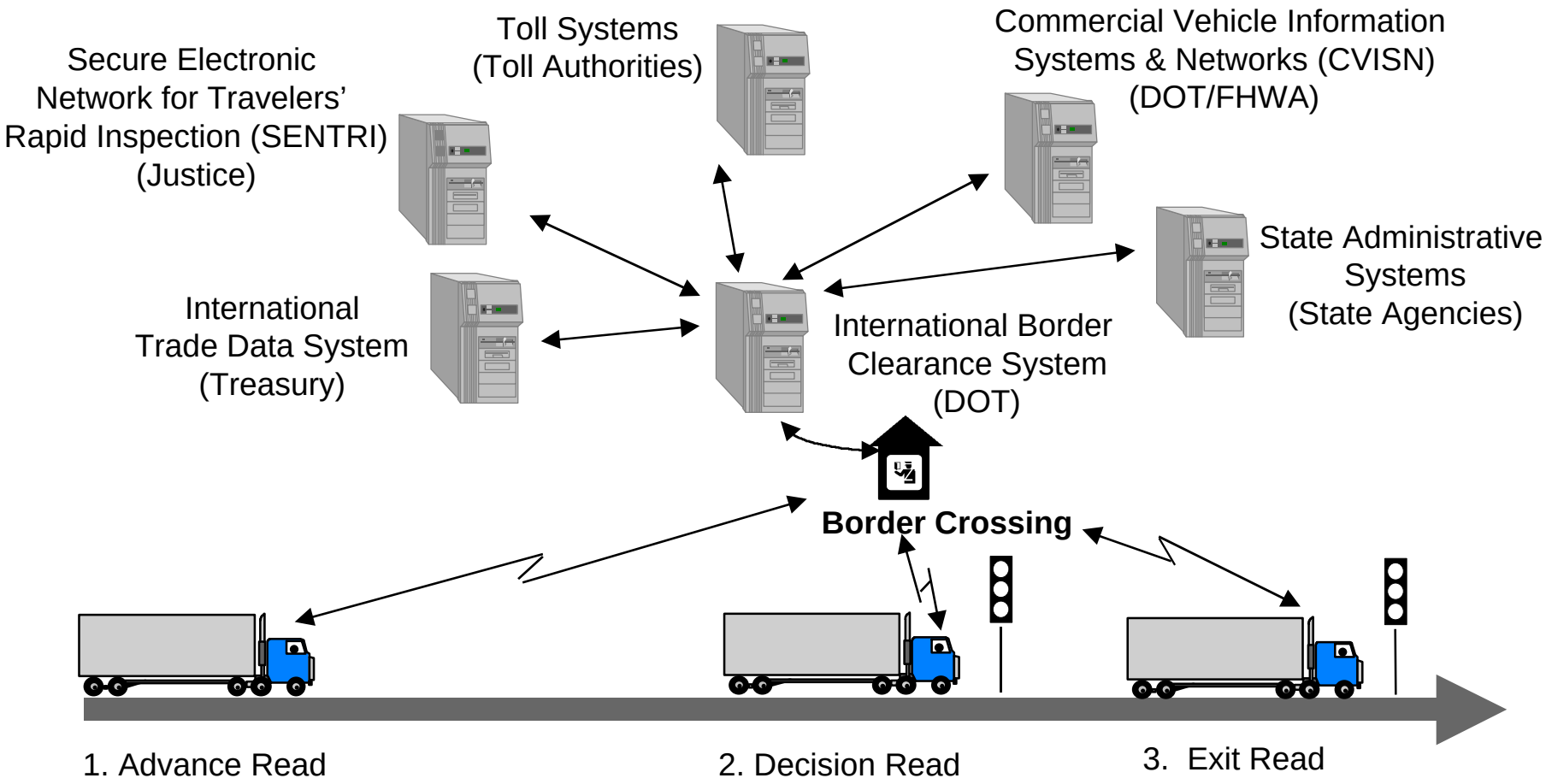
Long-Term Objectives:

- Provide for efficient, safe international trade transportation, into and out of the United States
- Provide for CVO safety and credentials screening at the border for all carriers, vehicles, and drivers who want to cross the border for international trade
- Support the agencies (FHWA/OMC and state DOTs) responsible for commercial vehicle safety and credentials enforcement

NATAP Objectives:

- Demonstrate feasibility of performing CVO safety screening at the border for a limited number of US carriers

IBC Program Integrates CV Operations with Future Border Crossing Processes



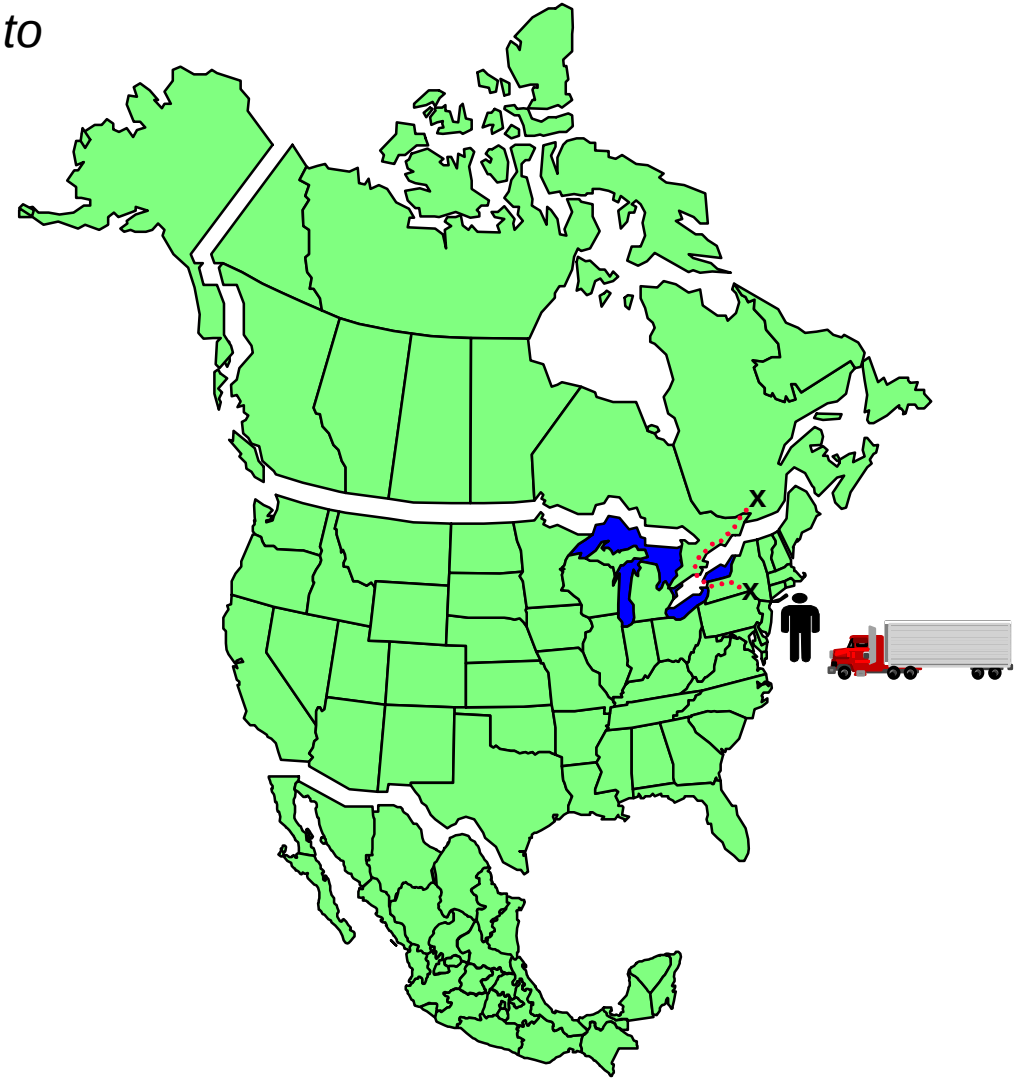
International Border Crossing (IBC)

Trip Scenario: From United States to Canada (or Mexico)

Trip begins in U.S. and ends in Canada.

Major stages in the trip (from U.S. perspective):

1. **Establish CV credentials and good safety record necessary to operate in both countries.**
2. **File with United States ITDS and Canadian equivalent.**
3. **Initialize tag with IDs. Load cargo and seal cargo compartment.**
4. **Cross from United States into Canada. Undergo border-crossing checks (customs, immigration, etc.) plus normal electronic screening at border.**
5. **Drive through Canada.**
6. **Deliver goods to destination.**

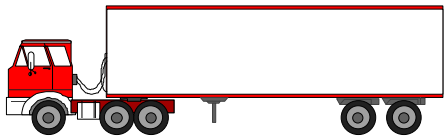


ITS Applications of DSRC

Private Vehicle

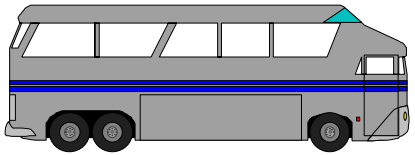
Electronic Toll Collection
Parking Management
In-Vehicle Signing
Probe Data Collection
Intersection Collision Warning/Avoidance
Automated Highway System

Commercial Vehicle



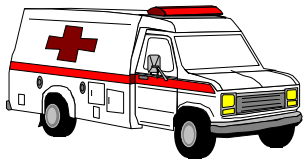
Roadside Electronic Screening
International Border Clearance
Driver's Daily Log
Vehicle Safety Inspection
On-board Safety Data
Fleet and Freight Management

Transit Vehicle



Local Signal Priority Request

Emergency Vehicle



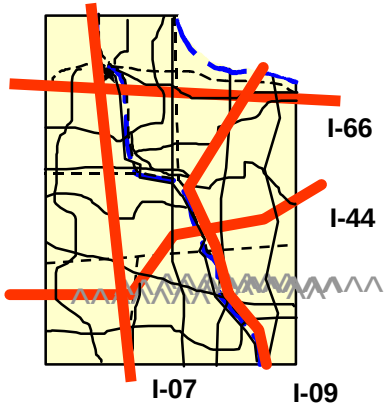
Preemption Request

Notes

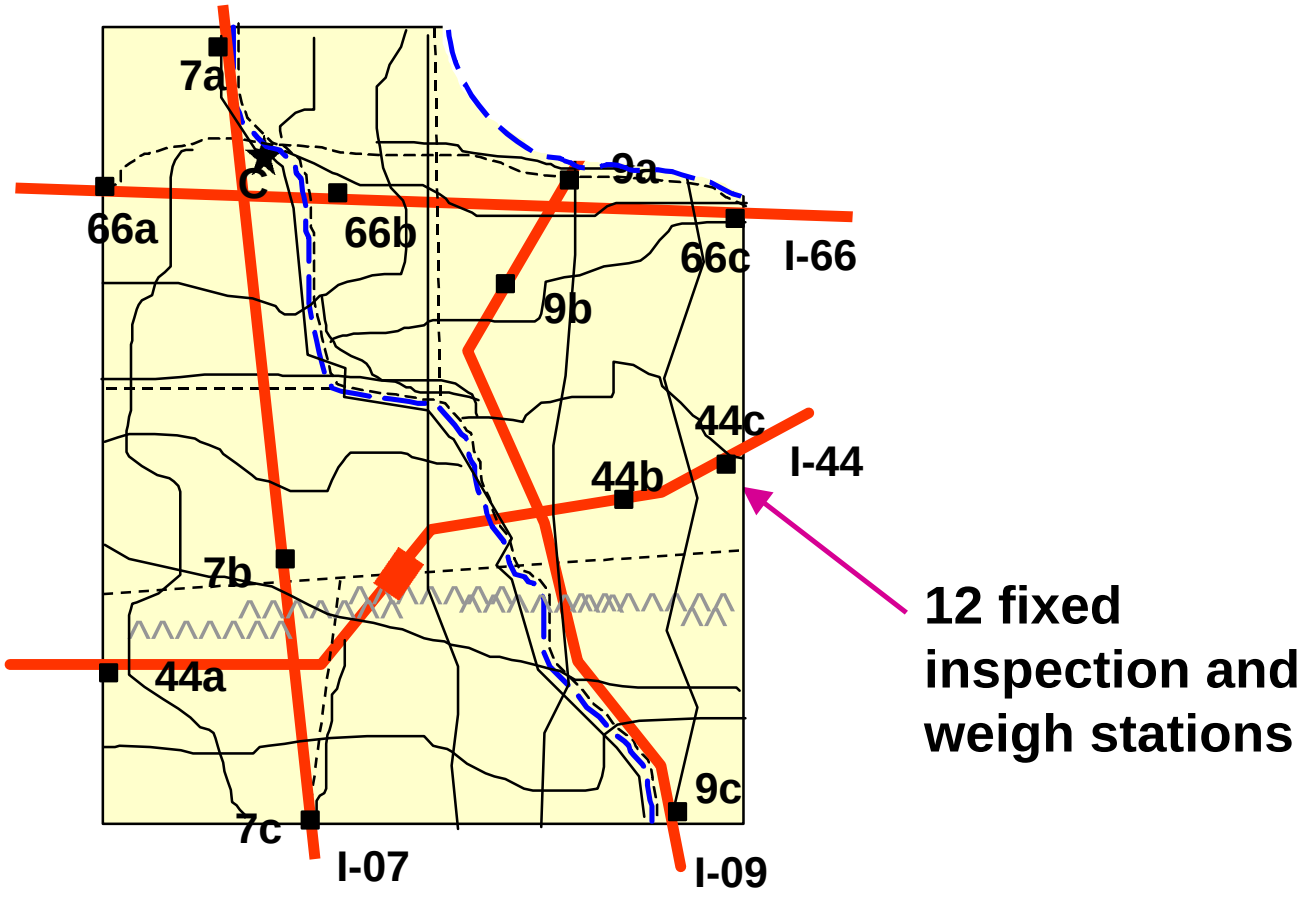
Electronic Screening in Midland

Midland's Issues: Commercial Vehicle Checks at the Roadside

- Heavy traffic sometimes closes a few existing weigh stations
- Vehicles are increasingly using bypass routes to avoid weigh stations



Commercial Vehicle Operations in Midland Today

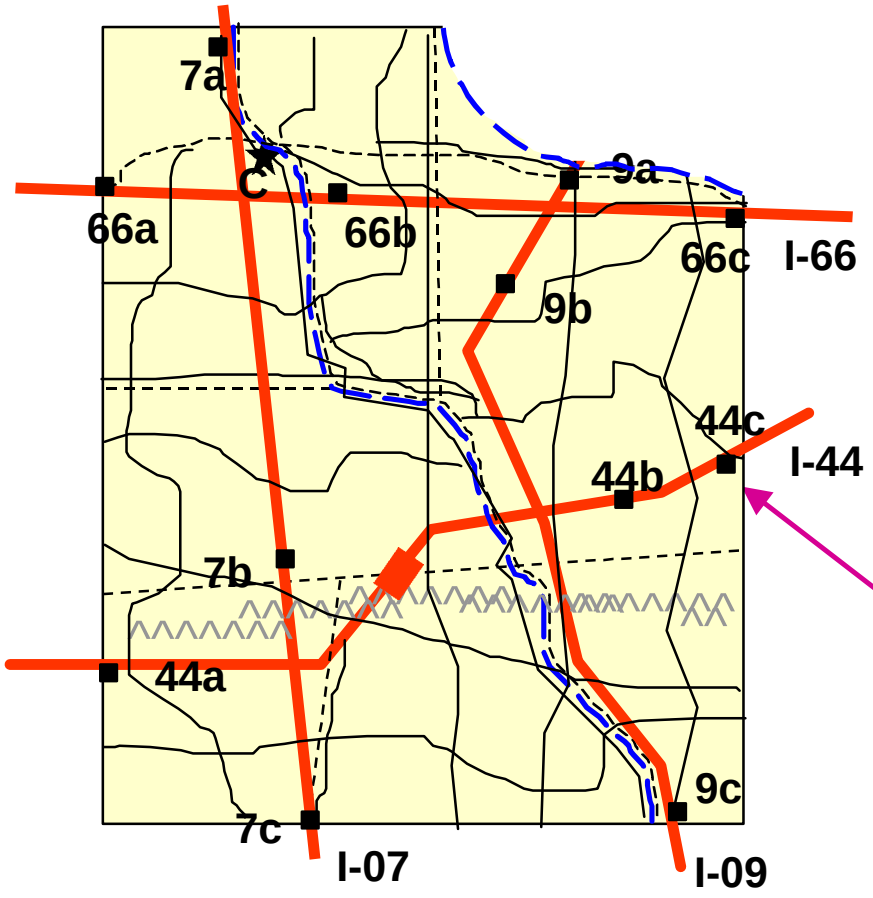


Commercial Vehicle Operations in Midland Inspection/Weigh Station

Station Traffic Summary

- 9c, 44c: Light Traffic
  - Existing station capacity sufficient
- 7c, 44a: Seasonal
  - Light traffic except during fall harvest season
- 7a, 66a: Moderate traffic
  - Stations busy but rarely close
  - Delays during peak traffic hours
- 7b, 9a, 9b, 44b, 66b: Heavy Traffic
  - Stations frequently closed when capacity exceeded
  - Long delays; Many vehicles bypass on secondary routes to avoid delays

Commercial Vehicle Operations in Midland Today



12 fixed inspection and weigh stations

Commercial Vehicle Operations in Midland Inspection/Weigh Station (cont.)

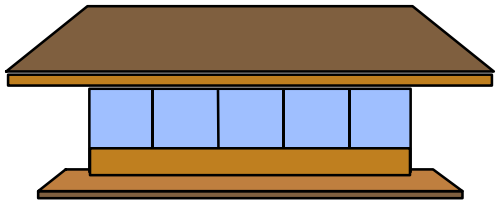
Carrier Operations

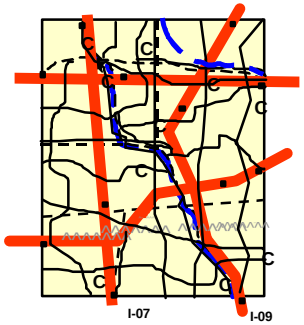
- Widget haulers are concentrated along I-07 corridor and usually carrying maximum legal weight
- Vehicles operated by ABC Trucking and XYZ Haulers frequently spotted on secondary routes around weigh stations
- Several local intrastate carriers based in Midburg have delivery patterns which frequently travel secondary routes around city and/or pass only a single inspection station (66b)

Midland Objectives for Electronic Screening

Improve the screening by roadside enforcement operations

- Focus on carriers, drivers, and vehicles operating unsafely or illegally
- Reduce the frequency and duration of stops for safe and legal carriers
- Enable increased use of mobile or remote enforcement

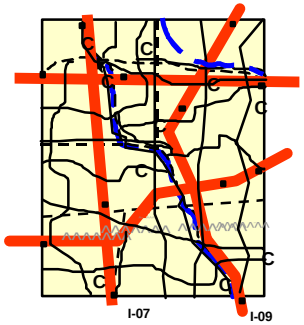




Notes

Discussion: How Should Midland Implement Electronic Screening?

- **What are Midland's options for implementing electronic screening, and what are the pros and cons of each?**
  - Hint: Consider the technologies discussed earlier.



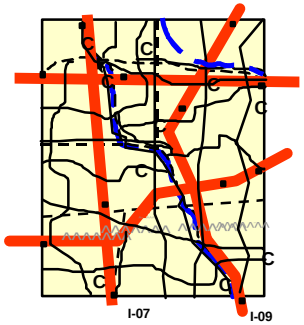
Discussion: How Should Midland Implement Electronic Screening?

Screening Option	Midland	
	Pro	Con

Discussion: How Should Midland Implement Electronic Screening?

- **Where should Midland deploy these various screening options/technologies?**

- **How do these options fit in your own state?**
  - Hint: What issues (i.e., screening factors, cost, interoperability) are most important to you?



Discussion: How Do These Options Fit in Your State?

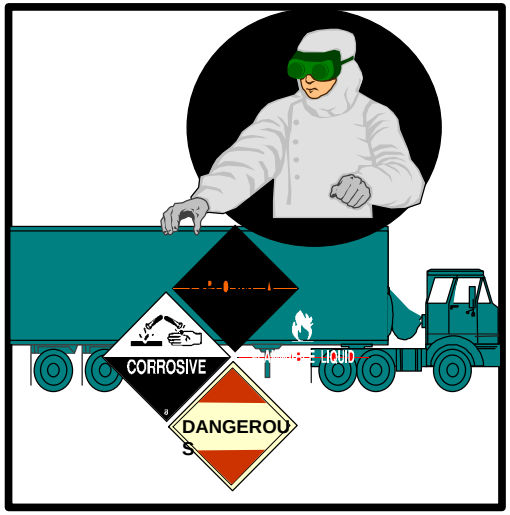
Screening Option	Your state		
	High Priority	Low Priority	Not Applicable

Recap & Questions

Module Objectives:

- Define electronic screening
- Describe how Weigh In Motion (WIM) and Dedicated Short-Range Communications (DSRC) support electronic screening
- Identify electronic screening systems
- Describe International Border Clearance (IBC) and other DSRC operations
- Relate electronic screening operations to Midland

Any Questions?



MODULE 6

Carrier Operations

US Dept of Transportation

Carrier Operations

Program Areas

Carrier Operations

- **Fleet and vehicle management**
- **Traveler information systems**
- **Hazardous Materials incident response**

CVISN Architecture (Technical Infrastructure)

Mainstreaming and Deployment Planning (Organizational Infrastructure)

Learning Objectives

Participants will be able to:

- **Characterize** the operating environment for carriers
- **Identify** three program elements of Carrier Operations
    - Fleet and Vehicle Management
    - Traveler Information Systems
    - Hazmat Incident Response
- **Describe** the technologies associated with Fleet and Vehicle Management
    - Electronic Trip Recorders
    - Routing and Dispatch Systems
    - Communications Systems
    - Automatic Vehicle Location (AVL) Systems

Module Structure

- Carrier operations overview
- Fleet and Vehicle Management Systems
    - Electronic Trip Recorders
    - Routing and Dispatch Systems
    - Communications Systems
    - Automatic Vehicle Location
- Traveler Information Systems
- Incident Management Projects
- Application to Midland

Carrier Operations Overview

Carrier Operations Technologies in Use

- What types of technology are carriers using in your jurisdiction?
- What is the ITS/CVO Carrier Operations Program all about?
- Carrier Operations projects seek to improve motor carrier safety and operating efficiencies through new information sources integrated with motor carrier technology systems. For example, these projects can improve freight mobility by linking motor carrier operations to real-time traffic information.

The ITS/CVO carrier operations program is building upon existing activity in two areas:

- Private sector deployment of fleet management systems, and
- Public sector deployment of traffic management systems.

The three elements we will be discussing in this module are:

- Fleet and Vehicle Management
- Traveler Information Systems
- Hazardous Materials Incident Response

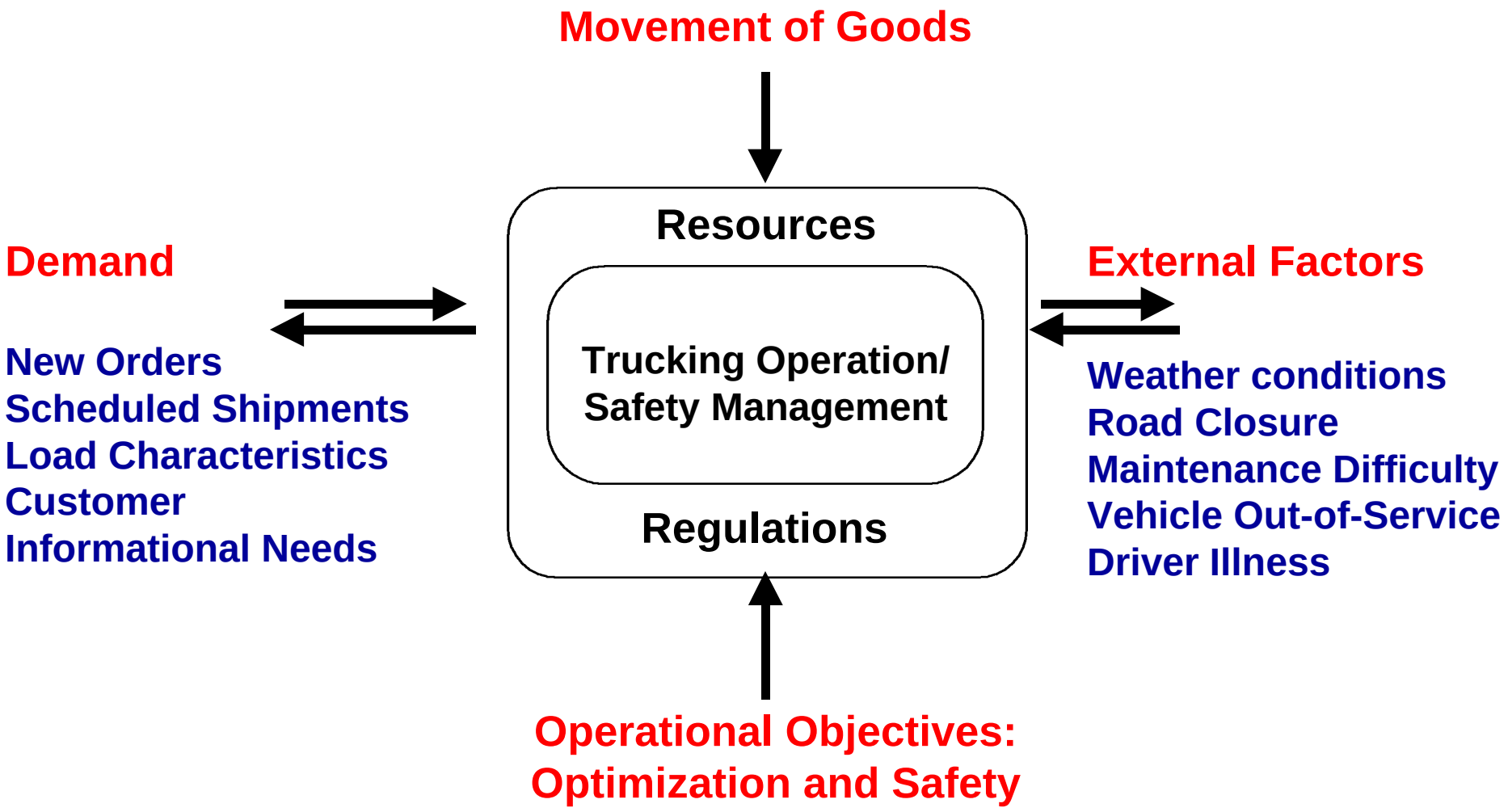
Fleet and Vehicle Management Systems

Allow fleet managers to gather, process and use myriad information regarding:

- Deployment and performance of their trucks
- Driver availability and performance
- Available loads and load status
- Maintenance scheduling
- Etc.

Facilitate safe, timely, and cost-effective movement of goods

Motor Carrier Operating Environment



Motor Carrier - Operational Functions

Business Management

Accounting

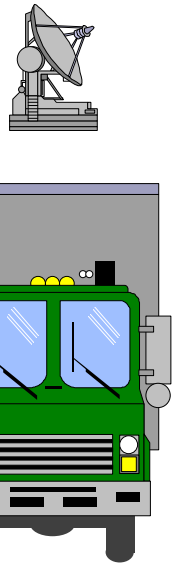
Load Information/Matching

Credentials Management

Operating Authority/ Registration

Fuel Tax

Drivers' Log Auditing System



Information Management

Data Integration and Management Systems

Fleet Management

Routing and Dispatch/Mapping

Mobile Communications

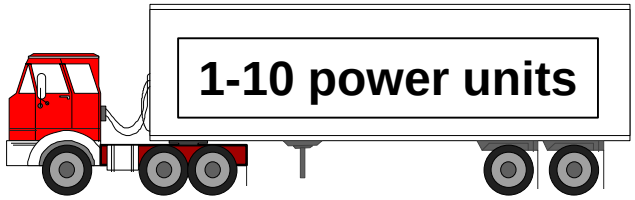
Equipment and Load/ Tracking and Identification

Driver Management

Maintenance

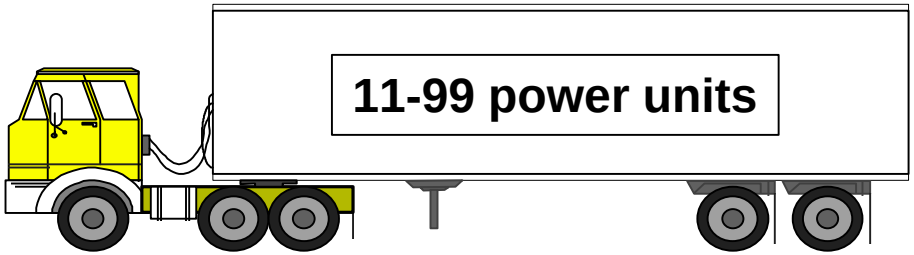
Fleet Sizes and Hauling Distances Differ

Small Carrier

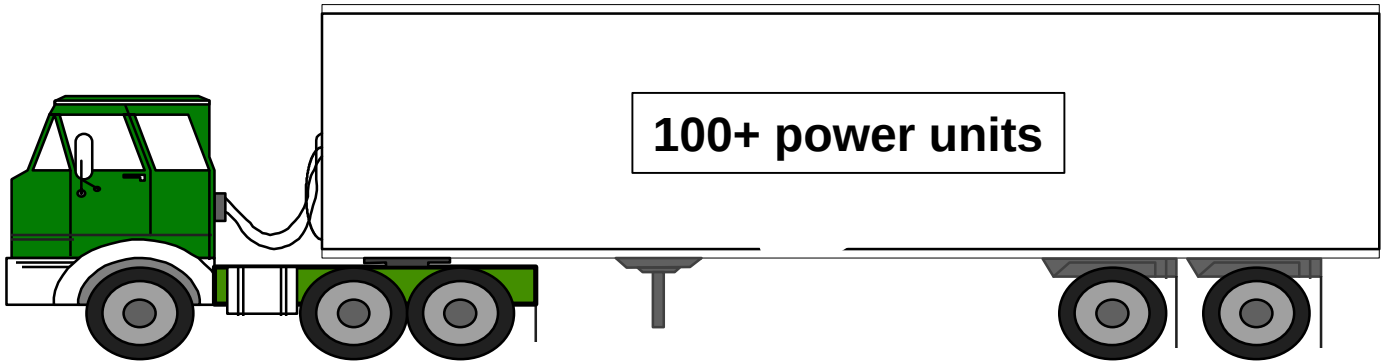


<100 mile hauls (Local)
100 - 1000 mile hauls (Regional)
>1000 mile hauls (National)

Medium Carrier



Large Carrier



Functions and Technology Examples for National Carriers

Business Management

Accounting

Business software

Driver Settlement

Load Information/Matching

Electronic Data Interchange (EDI)

Credentials Management

Operating Authority/Registration

Filing and receiving credentials

Fuel Tax

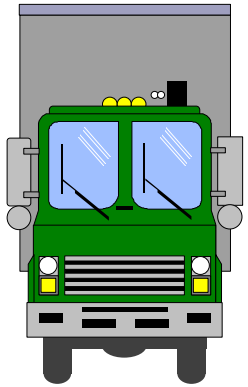
Computing and reporting (EDI)
Interstate Transportation

Drivers' Log Auditing System

Hours-of-Service auditing/reporting

Information Management

Data Integration and Management Systems



Functions and Technology Examples for National Carriers (Cont.)

Fleet Management

Routing and Dispatch/Mapping

Computer-Aided Systems

Mobile Communications

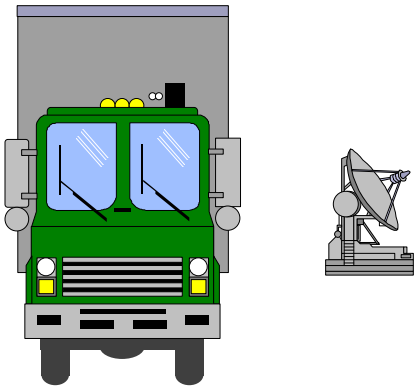
In-Vehicle Communication

Fleet Management

Equipment and Load/ Tracking and Identification

Automatic Equipment Location

Data collection and Interchange



Fleet Management

Driver Management

Monitoring, training, credentials

Maintenance

Preventive maintenance tracking

Fleet and Vehicle Management Systems

- Electronic Trip Recorders
- Routing & Dispatching Systems
- Communications Systems
- Automatic Vehicle Location

Photo Courtesy of Fleet Owner Magazine

Fleet and Vehicle Management Systems

Electronic Trip Recorders (also known as onboard computers):

- Current generation: automatically monitor and record information on performance of the vehicle and/or the driver.
- More sophisticated units:
  - provide keyboard and display screen,
  - allow the driver to log information; i.e., fuel purchases, hours of service,
  - have removable memory cartridge usually is used to transfer the recorded data onto a computer.

    These systems can relay real-time information while in transit to motor carrier terminals via wireless communications.

    Major users include large or private fleets and carriers with national or regional operations

On-Board Computers/Hand Held Computers

- Mobile data collection, storage, processing devices either vehicle mounted or portable

- Often end-station equipment for mobile communications system allowing real-time transfer of vehicle/driver/load information to carrier

On-Board Computers/Hand Held Computers

Application/Benefits

- Vehicle/load condition/driver performance monitored-historically or in real-time
- Improved vehicle diagnostics
- Load tracking
- Reduced driver administrative burdens
- Reduced staff time-data entry/audits

Fleet and Vehicle Management Systems

- Electronic Trip Recorders
- Routing & Dispatching Systems
- Communications Systems
- Automatic Vehicle Location

Photo Courtesy of Fleet Owner Magazine

Fleet and Vehicle Management Systems

Routing & Dispatching Systems

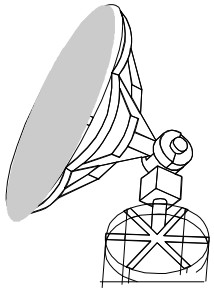
- Used to maximize fleet efficiency and reduce operating costs.
- Uses digital mapping and optimization algorithms to determine the most direct route between origin and destination, or for a series of stops.

The two major categories of routing and dispatching software are:

- Static Routing and Dispatching Software:
  - Provides motor carriers with a routing plan for a fleet of vehicles.
  - Does not have the capacity to analyze impacts of real-time information such as congestion or incidents.
  - Major users include carriers operating on fixed routes with the same customers
- Dynamic Routing and Dispatching Software:
  - Uses real-time congestion and shipment volume information to determine the most efficient route for a vehicle
  - Major users include vehicles over variable routes; national fleets.

Fleet and Vehicle Management Systems

- Electronic Trip Recorders
- Routing & Dispatching Systems
- Communications Systems
- Automatic Vehicle Location



Fleet and Vehicle Management Systems

Communications Systems

- Provides driver-to-driver communication, and
- a link between the carrier's terminal, dispatch office, and vehicles.
- The systems available on the market today vary in terms of their sophistication, cost, and functionality.
- The principal technology for deskside-to-vehicle communication are:
  - Telephone and facsimile
  - Advisory radio and radio digital broadcast systems.
  - Mobile phones, citizen band radios, and land mobile communications.
  - Onboard facsimiles, satellite transceivers, and two-way data text communications.
  - Major users include large fleets, especially those with time sensitive cargo and variable routes.

Fleet and Vehicle Management Systems

- Electronic Trip Recorders
- Routing & Dispatching Systems
- Communications Systems
- Automatic Vehicle Location

Fleet and Vehicle Management Systems

Automatic Vehicle Location (AVL)

- Enables real-time identification of a vehicle's location relative to a map
- Assists with package tracking and real-time routing
- Involves global positioning (GPS), which locate vehicles using trilateration from multiple satellite-based transmitters.
- Major users include carriers operating over long distances 500 miles).

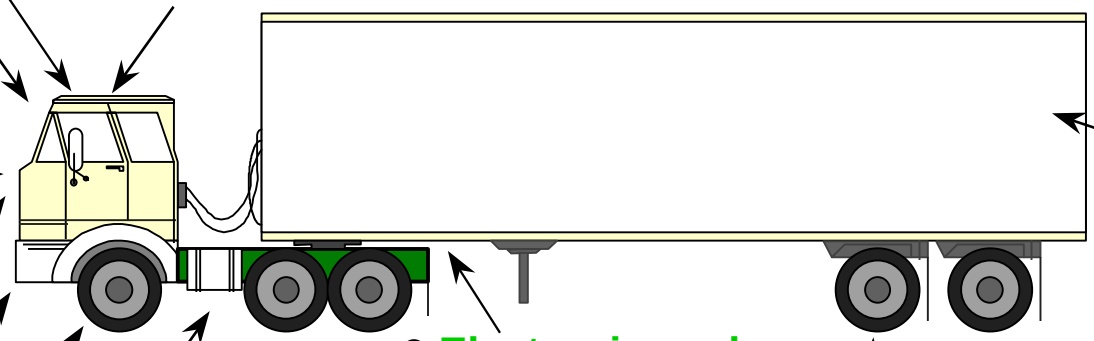
Trucking Technologies - In-Vehicle Devices

✓ **Mobile Communications (voice and/or data)**

▲ *Automatic Vehicle Location*

▲ *Automatic Toll Collection & Screening Transponders*

▲ *On Board Computers*



● Automatic Equipment Identification

● Electronic scales

● Tire Pressure Monitoring

▲ *Vehicle Systems Monitoring Engine Control Module, Fuel, Brake, Transmission Monitors*

● Accident Avoidance Systems

Company information and examples of products for the above devices can be seen in FHWA's Technology Truck, on the World Wide Web at

http://www.ornl.gov/dp111/index.htm

- and at the Trucking Technology Magazine at

http://www.truckingtechnologymag.com

KEY

✓ **Common technology**

▲ *Recently deployed technology*

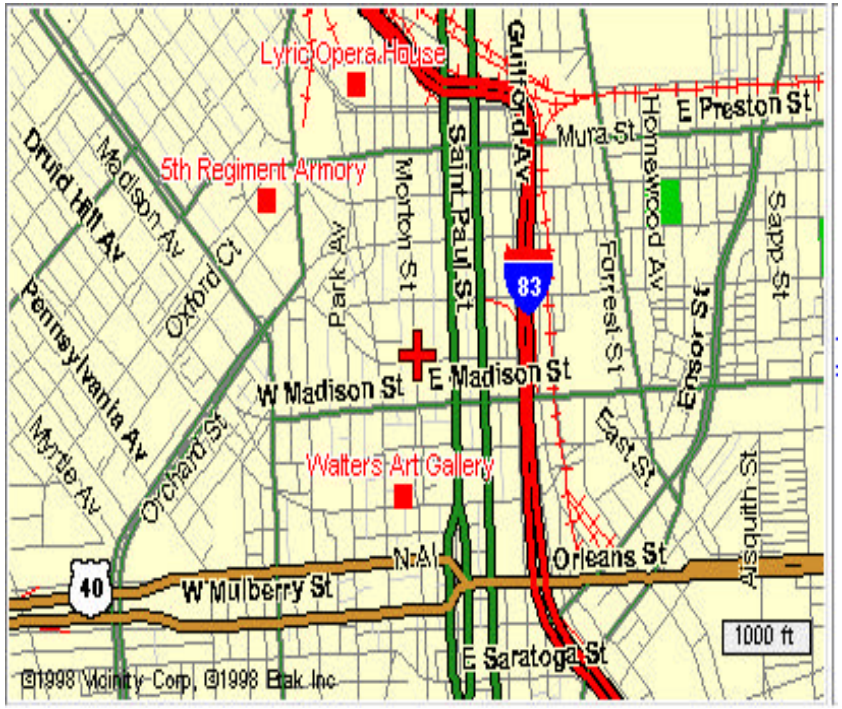
● Emerging technology

Emerging In-Vehicle Technologies

- Accident Avoidance
  - Proximity Warning Systems
  - Drowsy Driver Systems
- Electronic Scales
- Tire Pressure Monitoring
- Automated Equipment Identification
  - RF Toll Transponders
  - Roadside Screening Transponders
  - Bar Coded Equipment

Traveler Information Systems

- Collection, coordination, and dissemination of information on travel conditions
- Provide information for safe and efficient operations
- Local and regional impacts
- Strong benefits to public and private sectors
- Least developed area of ITS/CVO
- Oriented toward passenger cars



Traveler Information Systems

The objective of this element is to provide motor carriers with information on congestion, incidents, weather, and optimum routing that they need for safe and efficient operations. This element is one of the least developed areas of the ITS/CVO Program. Most traffic management applications are oriented to passenger cars, although their benefits are available to commercial vehicles as well.

Communications are commonly handled directly by police dispatchers, but an increasing number of cities and States are building special purpose traffic management centers to coordinate traffic and incident information. Most jurisdictions have prepared traffic diversion plans for major incidents, and use highway advisory radio, variable message signs, and other communication venues to reroute traffic.

Traveler Information Systems

- Collection, coordination, and dissemination of information on travel conditions
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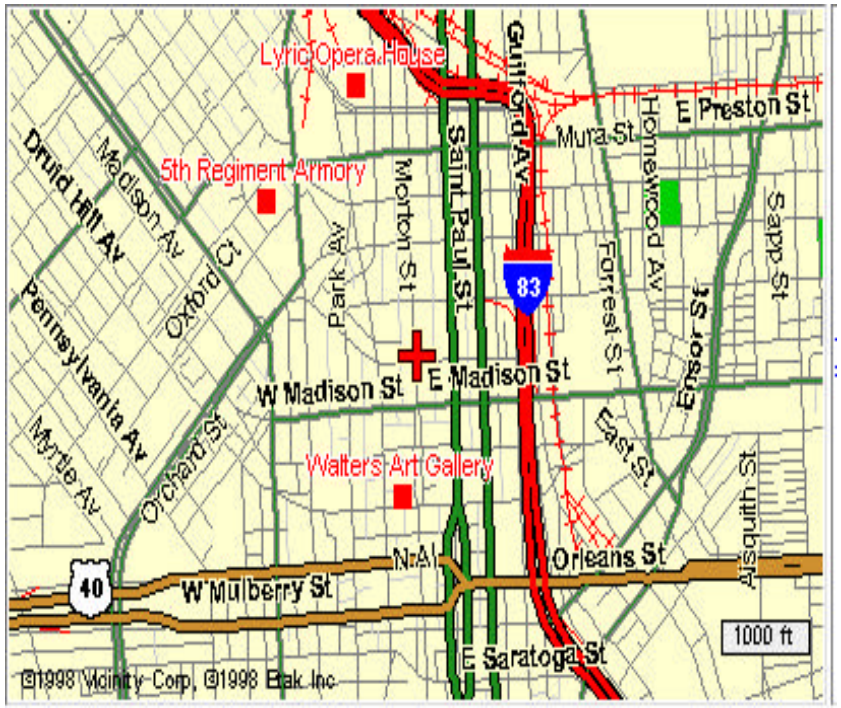


Traveler Information Systems

Communications are commonly handled directly by police dispatchers, but an increasing number of cities and states are building special purpose traffic management centers to coordinate traffic information and incident management.

Most jurisdictions have prepared traffic diversion plans for major incidents, and use highway advisory radio, changeable message signs, cellular phone, Internet, and other communication venues to divert traffic away from the incident area. Additionally, inter-jurisdictional incident information exchange capabilities are under development to enhance notification and alternate routing possibilities.

Traveler information systems for motor carriers can readily leverage this developing information infrastructure.

Electronic Data Interchange/Internet

- Enhanced marketing reach
- Automated identification and bidding on loads
- Transfer business documents
- Fuel purchase records transfer
- Access to posted travel conditions
- Posting of HazMat loads for emergency responders

Notes

Traveler Information Systems Projects

Objectives

- Develop operations tests of ITS technologies that provide motor carriers with the information on congestion, incidents, weather, and optimum routing that they need for ***safe*** and ***efficient*** operations.
- Streamline State administrative, regulatory, and enforcement procedures.

I-95 Corridor Coalition

- Improve Truck Regulatory Process
- Define Trucking Patterns & Develop ITS Technologies

Incident Management Projects

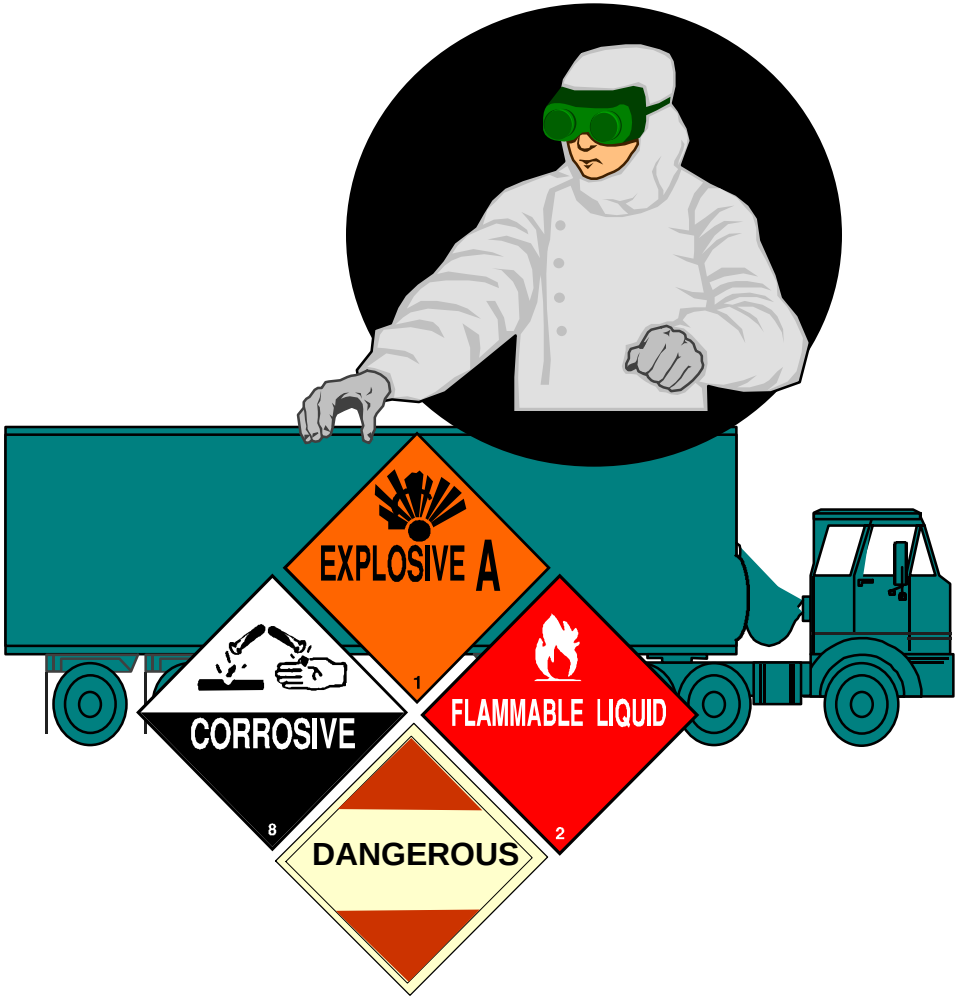
Incident Management Projects are activities to enable more rapid detection, response, and clearance of incidents from highways, and efforts to spread information about the incident to encourage drivers to seek alternate routes and reduce traffic queues.

Three stages:

- Detection and Verification
- Response and Clearance
- Recovery and Information.

HazMat Incident Response

- HazMat Monitoring
- Inventory control
- Automated Reporting
- Theft Recovery
- Electronic Vehicle Monitoring
- Asset Management



HazMat Incident Response

Operation Respond

- Provides rapid, accurate information on freight cargo following accidents/spills.
- Information exchange between railroads, intermodal motor carriers, and first responders
- speeds flow of information and notification about hazardous materials incidents.
- participants include the Federal Railroad Administration, FHWA, and RSPA.

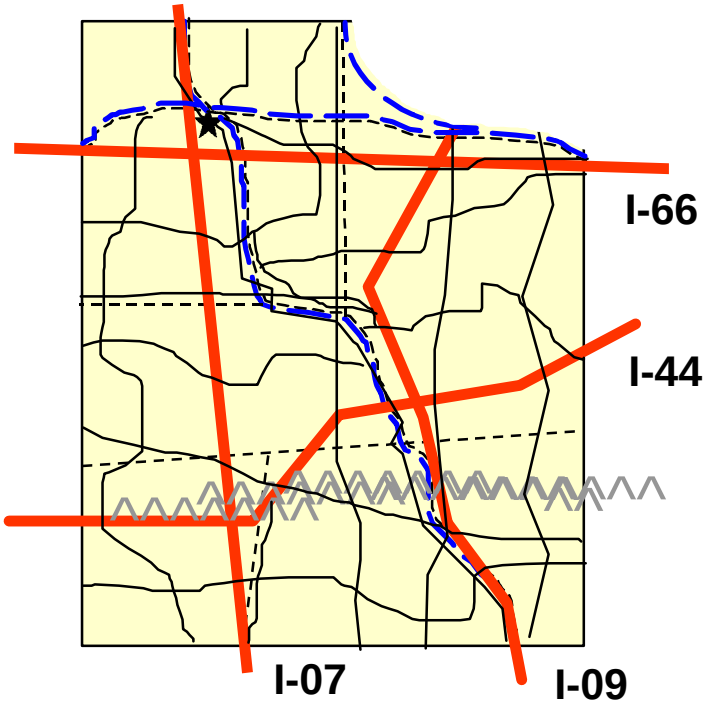
Hazardous Materials Fleet Management and Data Monitoring System

- Information systems to identify the contents of hazardous materials transported by motor carriers
- Participants include the National Institute for Environmental Renewal (NIER), PA DOT, FHWA, PAR Government Systems Corporation

Application to Midland

Consider the Case
State of Midland

Where would these Carrier Operations technologies have the most impact?



Application to Midland

This module has introduced technologies that can improve the safe and efficient operation of motor carriers (as well as others on the highway systems). Let's take just a few minutes now to identify where these technologies could impact safety on the Midland highway system.

Briefly review the information provided in the Midland case to identify areas where the Carrier Operations technology just introduced could improve safety of commercial operations in Midland.

Application to Midland (cont.)

What are some examples of the technologies you would like to see implemented in Midland?

Examples:

Why?

Recap & Questions

Module Objectives:

- Characterize the operating environment for carriers
- Identify three program elements of Carrier Operations
  - Fleet and Vehicle Management
  - Traveler Information Systems
  - Hazmat Incident Response
- Describe the technologies associated with Fleet and Vehicle Management
  - Electronic Trip Recorders
  - Routing and Dispatch Systems
  - Communications Systems
  - Automatic Vehicle Location (AVL) Systems

Any Questions?

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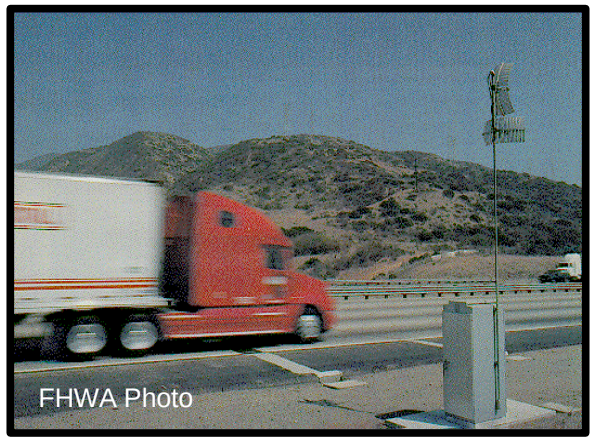
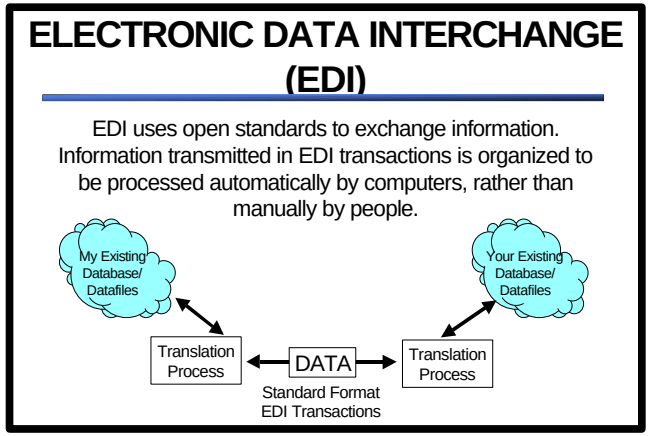




MODULE 7

Commercial Vehicle Information Systems and Networks - CVISN

CVISN Architecture (Technical Infrastructure)

Program Areas

Safety Assurance	Credentials Administration	Electronic Screening	Carrier Operations
• Access to driver, vehicle, and carrier information on inspections and accidents • Automated inspections and reviews • Onboard safety monitoring	• Electronic credentialing • Clearinghouses • Interagency data exchange • Interstate data exchange	• Automated weight and credentials screening • International electronic border clearance	• Fleet and vehicle management • Traveler information systems • Hazardous Materials incident response

CVISN Architecture (Technical Infrastructure)

Mainstreaming and Deployment Planning (Organizational Infrastructure)

Learning Objectives

Participants will be able to:

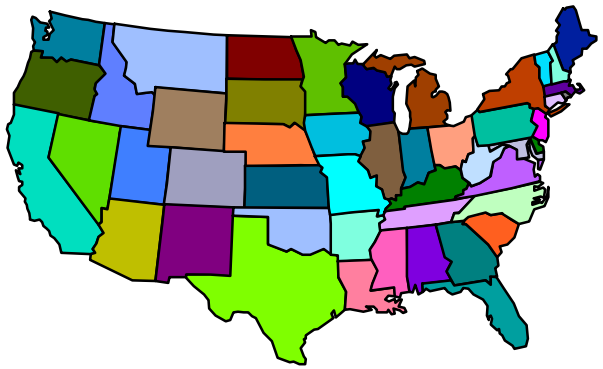
- **Define** the term “CVISN”
- **Outline** basic CVISN concepts:
  - Partnerships
  - Architecture
  - Deployment strategy
  - Prototype and pilot efforts
  - Conformance and Level 1
- **Identify** two systems or projects that are part of the CVISN architecture

Module Structure

- What part of ITS/CVO Systems and Technology is “CVISN”
- Key concepts
- CVISN Projects
- Summary

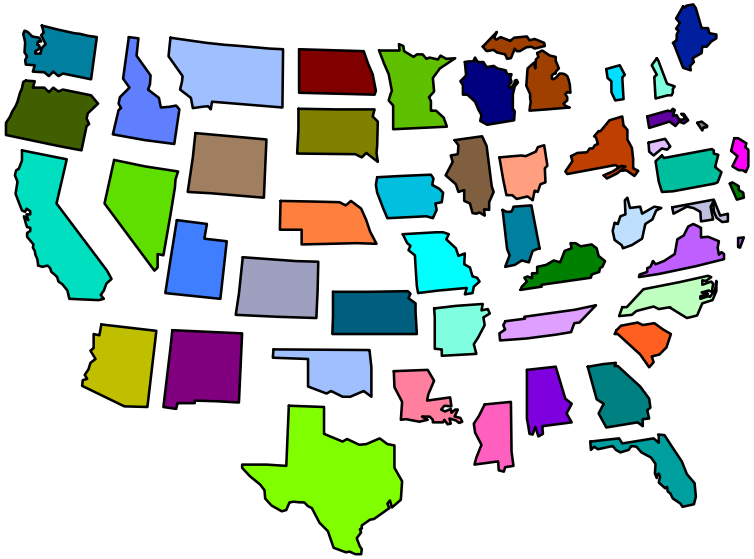
Notes

How to Connect the Islands of Technology (Information Systems and Networks) Supporting CVO?

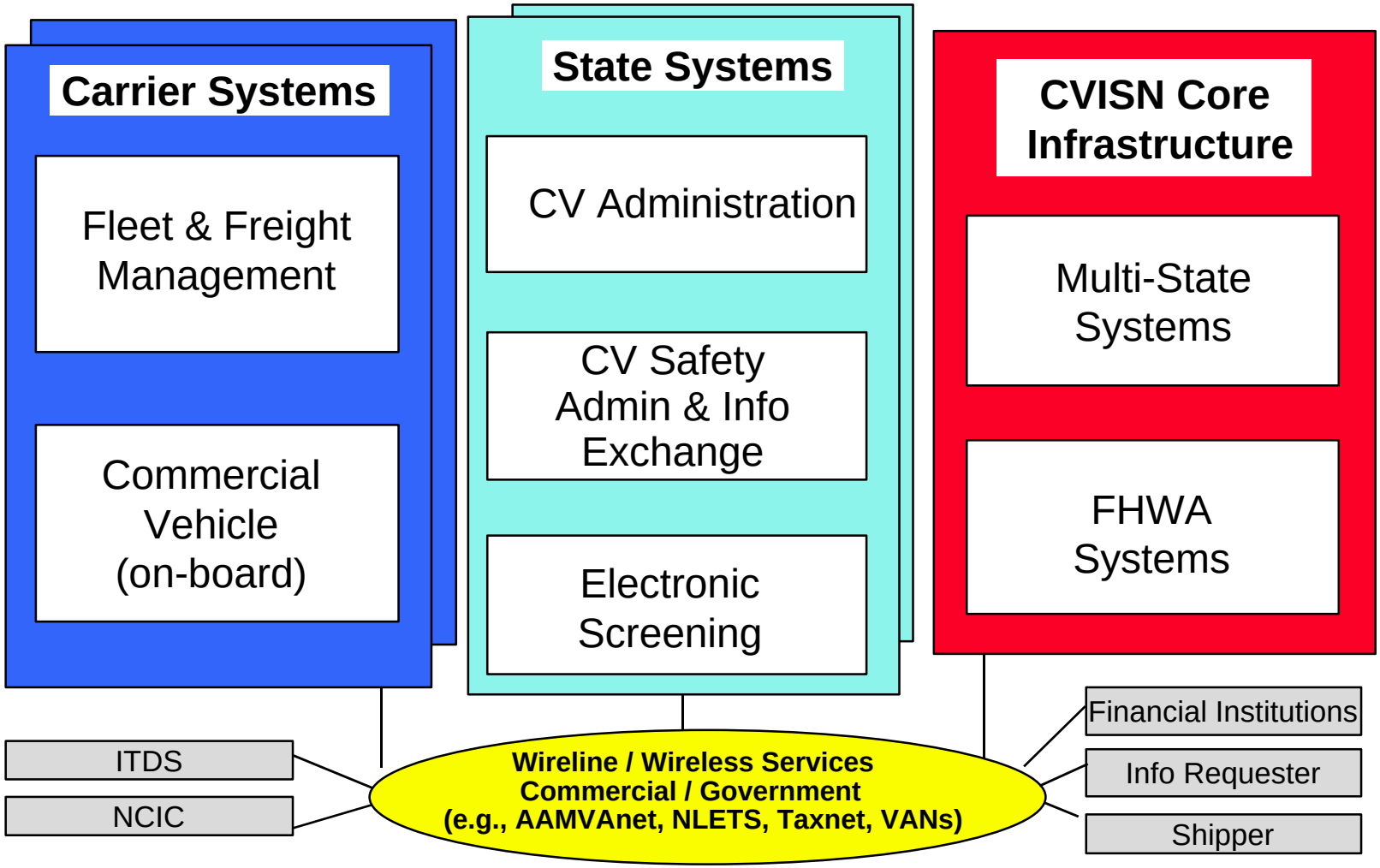


Roads were built to allow traffic flow within and between states.

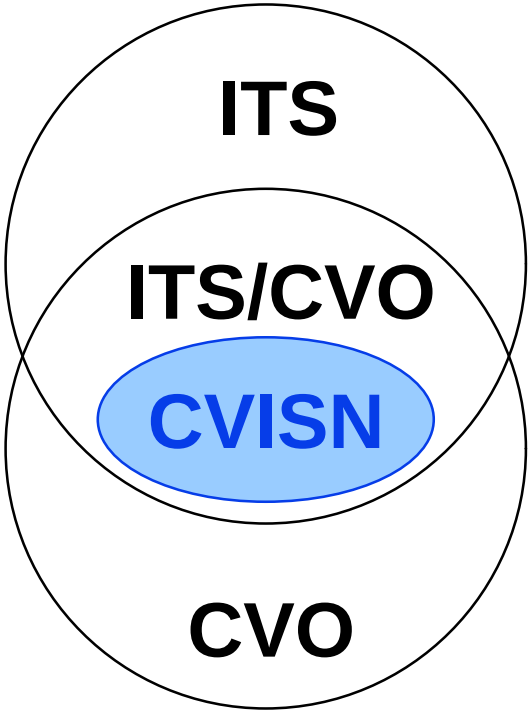
Information systems were built primarily to allow information to flow within a particular state or local agency, carrier, or supplier. As a result it is difficult to share information.



This View of the CVISN Design Groups Elements by Stakeholder Category



CVISN = Commercial Vehicle Information Systems and Networks



CVISN refers to the subset of ITS/CVO that contains the information systems and networks.

CVISN links the islands of technology.

CVISN = Commercial Vehicle Information Systems and Networks

CVISN (Commercial Vehicle Information Systems and Networks)

The term CVISN refers to the information systems and communications networks that support CVO. CVISN *includes* information systems owned and operated by governments, carriers, and other stakeholders. It *excludes* the sensor and control elements of ITS/CVO.

CVISN was originally defined to be a broad term covering all ITS/CVO information systems and networks as noted above. In common usage, "CVISN" refers to only the information systems and networks being developed as part of the CVISN prototype, pilot, and deployment projects. These are for safety information exchange, credentials administration, and electronic screening.

CVISN Projects Succeed When Stakeholders Form Partnerships

- State Agencies
- Carriers
- Service Providers & Manufacturers
- Professional & Trade Associations
- Federal Highway Administration (FHWA)

CVISN Projects Succeed When Stakeholders Form Partnerships

- State Agencies
  - Invest in ITS technology
  - Provide data to each other
  - Establish CVISN information infrastructure
  - Change processes to allow electronic commerce & paperless vehicles
- Carriers
  - Participate in CVISN projects
  - Install vehicle transponders
  - Invest in other technology when benefit justifies investment
- Service Providers & Manufacturers
  - Develop technologies
  - Provide products & services
- Professional & Trade Associations
  - Provide outreach to commercial vehicle professionals includingcarriers, drivers, etc.
  - Participate in ITS/CVO projects
  - Provide feedback on proposed changes to business activities
- Federal Government (especially FHWA)
  - Provide leadership
  - Expedite ITS/CVO deployment
  - Develop architecture
  - Develop deployment plan
  - Support system integration

CVISN Architecture Enables Electronic Information Exchange

- Electronic Data Interchange (EDI) standards
- Dedicated Short Range Communications (DSRC) standards
- Systems to capture data electronically at source
- Clearinghouse systems to share information
- A network of networks and systems provides electronic access to information for authorized users

CVISN Architecture Enables Electronic Information Exchange

- **Electronic Data Interchange (EDI)** – Computer-to-computer exchanges between stakeholders will be standard messages that use the features of EDI.
- **Dedicated Short Range Communications (DSRC)** – Communications between a commercial vehicle and "roadside facilities" such as the carrier's facility, CV Check Stations, or toll facilities will occur by using dedicated short range wireless communications. Standards are required to ensure that a vehicle can operate in multiple jurisdictions without changing equipment.
- **Source Data Capture** – The term "authoritative source," also known as a system of record, refers to that information system which can provide the correct answer to a question. The authoritative source is the final arbiter in the event of conflicts about data validity.
- Data captured at the source, and which have been authenticated by the authoritative source, have been proven to be genuine.
- **Clearinghouses** – Central "clearinghouses" are being developed to handle the allocation of fees, sharing of supporting data, and initiation of electronic fee transfers among member states. Each state requires that operators have valid credentials and pay fuel taxes. Under base state agreements, operators apply for credentials and pay taxes in base states. The base states allocate fees and taxes to other jurisdictions in which the applicant operates.
- **Network of Networks & Systems** – Using open standards for networks and systems and commercially available services, both private and public stakeholders exchange information.

CVISN Architecture Embodies Key Operational Concepts of ITS/CVO

Improved Processes through Information Technology

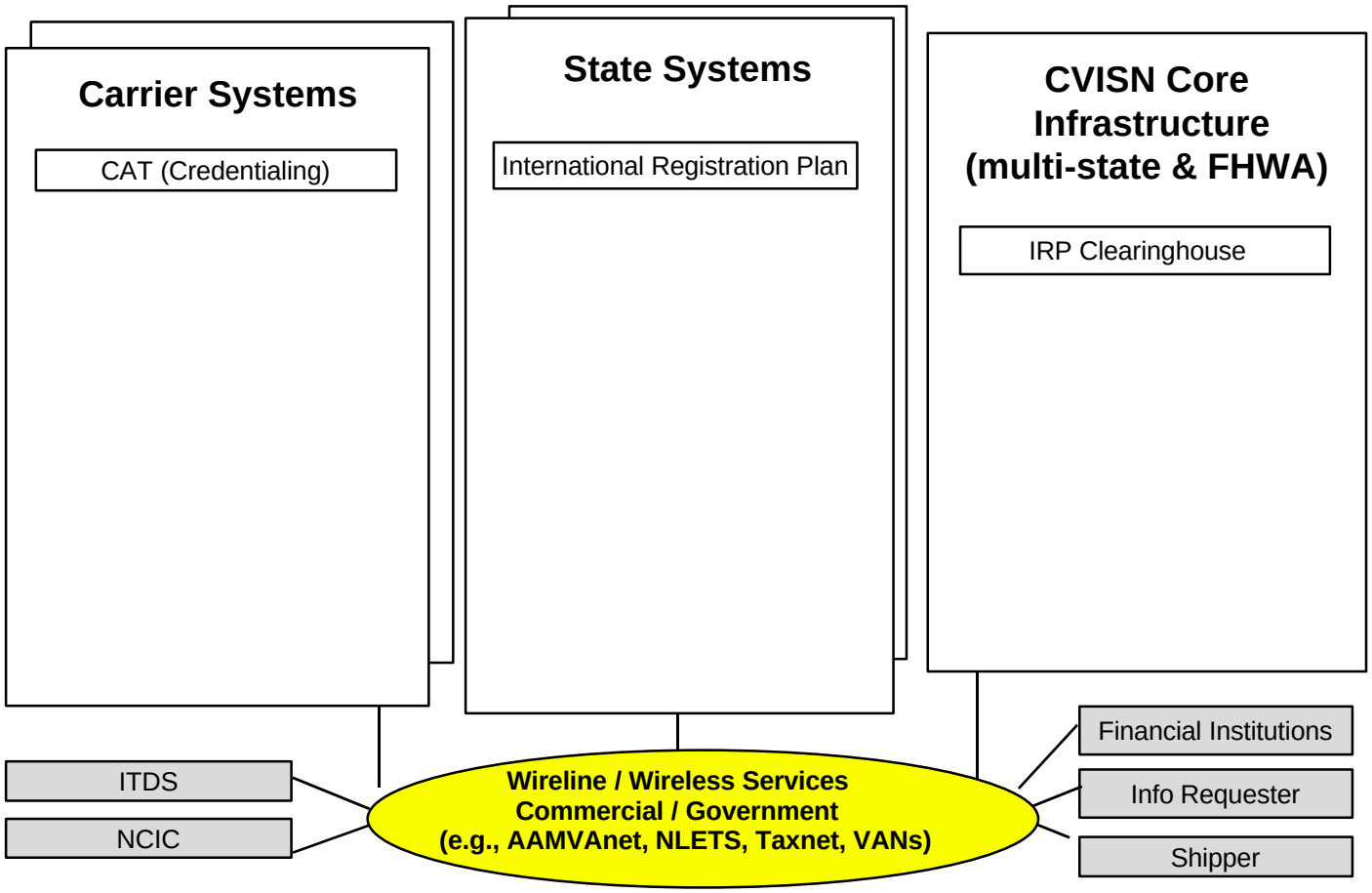
- Focus safety enforcement on high risks
- Electronic credentials and paperless vehicle
- Ubiquitous (but secure) electronic data access
- Standard snapshots and reports for carrier, vehicle, and driver information
- Electronic screening and automated roadside operations
- Flexible deployment options

CVISN Architecture Embodies Key Operational Concepts of ITS/CVO

- **Focus safety enforcement on high risks:** Providing enforcement personnel with current information about carriers, drivers, and vehicles allows them to select the carriers, drivers, and vehicles that have the highest safety risk. Systems that support safety enforcement include: ASAP MCDC, On-Board Communication, SAFETYNET/ AVALANCHE, CVIEW, Aspen, Citation & Accident, CDLIS, MCMIS, ASAP, CAPRI, and Unified Carrier Register.
- **Electronic credentials & paperless vehicle:** The fully electronic credential life cycle. Systems that support electronic credentials include: CAT, Internet Applications, Fuel Tax, IRP/Intrastate, Credentialing Interface, Treasury System, Titling, CDL/DL, Unified Carrier Register, HazMat, OS/OW, IRP Clearinghouse, IFTA Clearinghouse, and NMVTIS.
- **Ubiquitous (but secure) electronic data access:** The information necessary to carry out CVO functions includes data available to authorized users over commercially available wide area communications. Systems supporting electronic data access include: all of the systems shown.
- **Standard snapshots & reports for carrier, vehicle, & driver information:** Snapshots provide a standard format for exchanging basic data. Systems supporting snapshots include all state information systems, SafeVUE, CVIEW, MCMIS, and SAFER.
- **Electronic screening & automated roadside operations:** Weigh station screening and safety inspection process, greatly expedited through automation with technologies such as weigh-in-motion, hand-held computers, brake testing, and communications networks. Systems supporting electronic screening include On-Board Communications, Screening, Roadside Operations, and Sensor/Driver Communications.
- **Flexible deployment options:** The architecture provides a common technical framework and a basis for developing interface standards. It does not specify a particular design for states or carriers; it allows them to select from a wide range of options to meet their particular needs. The only constraints are design options in areas necessary to achieve <u>interoperability</u> and compatible practices.

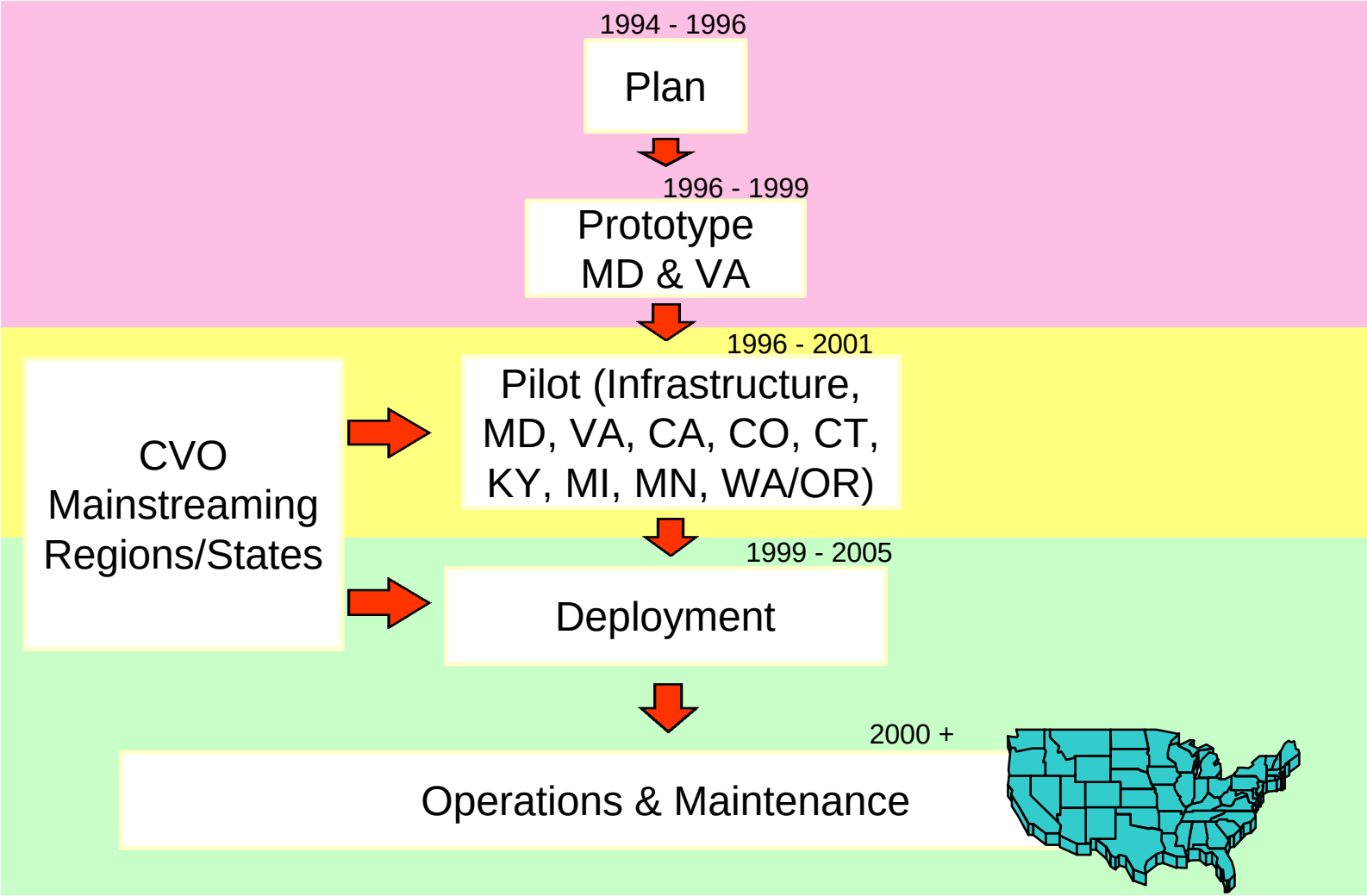
Exercise: Midland CVISN Components

Which CVO elements is Midland planning to develop, use, or modify that are part of CVISN?



Notes

CVISN Nationwide Deployment Strategy



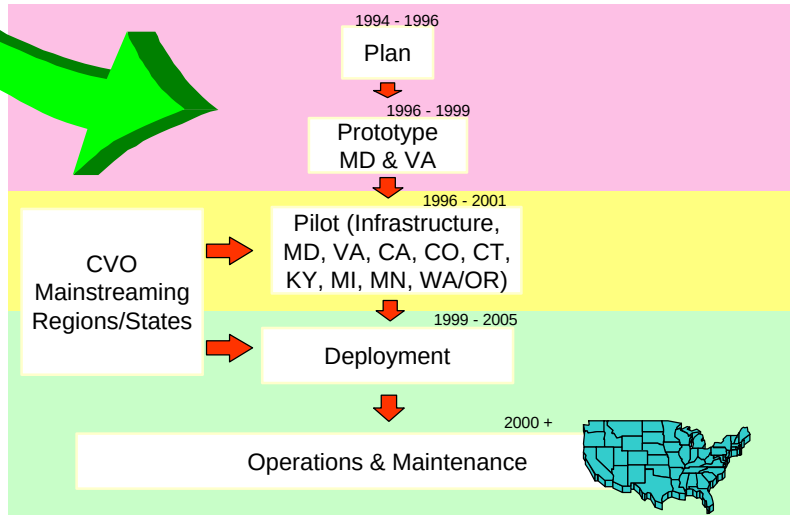
The CVISN Prototype

The CVISN Prototype Project

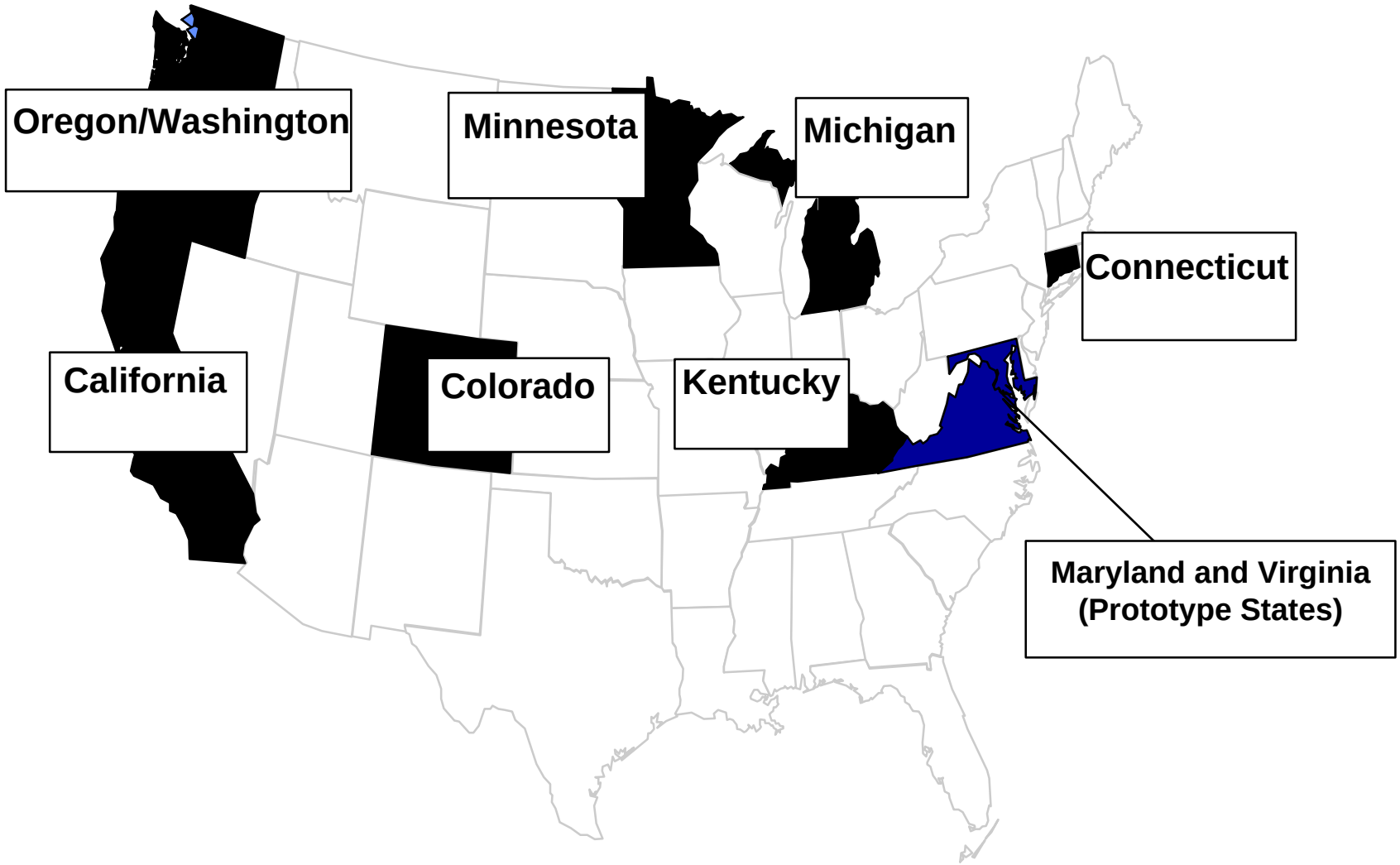
- Implement CVISN in two key states by developing and integrating information systems and networks to improve:
  - Safety
  - Effectiveness and efficiency of deskside activities
  - Effectiveness and efficiency of roadside activities
- Gain experience
- Provide feedback on CVISN Architecture and System Design
- Provide lessons learned, technical, and management documentation to the CVISN Pilot states

The CVISN Prototype tests key CVISN concepts, architecture and system design features in Maryland and Virginia

CVISN NATIONWIDE DEPLOYMENT STRATEGY



CVISN Pilot States Across the U.S.



Architectural Consistency is Required Under TEA-21

- Section 5206 (e) of TEA-21 requires that ITS projects using Highway Trust Funds must be in conformance with the National ITS Architecture

- The US DOT's Joint Program Office has issued Interim Guidance as a first step toward issuing formal rulemaking for architecture conformance in the year 2000

- The Interim Guidance recommends that ITS/CVO projects follow the conformance assurance process for architecture consistency

The Conformance Assurance Process (CAP) Checkpoints ITS/CVO Deployment Throughout the Lifecycle

Deployment Cycle	Checkpoints
MOA & Requirements Definition	**Start** ***Verify commitment to principles***
Top-Level Design	**Project Planning, Review & Top-Level Design Definition** ***Verify plan is sound and top-level design is consistent***
Detailed Design	**Detailed design for Phase "n" -** ***Verify detailed design is consistent***
Implementation Test	**Interoperability Testing at end of Phase "n" -** ***Test that systems meet standards and are interoperable***

Architecture Utilization Policy

<u>Strongly recommend</u> that project teams use these processes to achieve the required architecture conformance:

- Complete and maintain a Business Plan that encompasses all ITS/CVO activities in the state or region
- Attend the ITS/CVO technical training courses sponsored by FHWA
- Attend a series of CVISN Deployment Workshops designed to assure architecture conformance and interoperability of deployed systems
- Follow the conformance assurance process to achieve CVISN Level 1

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 & can evolve to include new technology & capabilities.

All the following elements of 3 capability areas have been implemented using applicable architectural guidelines, operational concepts, & standards:

- **Safety Information Exchange**
  - ASPEN (or equivalent) at all major inspection sites
  - Connection to SAFER
  - CVIEW (or equivalent) for snapshot exchange within state and to other states
- **Credentials Administration**
  - Automated processing (i.e., carrier application, state application processing, credential issuance) of at least IRP & IFTA credentials; ready to extend to other credentials (intrastate, titling, OS/OW, carrier registration, HAZMAT). *Note: Processing does not include e-payment.*
  - 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**
  - Implemented at a minimum of one fixed or mobile inspection site
  - Ready to replicate at other sites

Recap & Questions

Module Objectives:

- DEFINE the term “CVISN”
- OUTLINE basic CVISN concepts:
  - Partnerships
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  - Deployment strategy
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