CVISN Safety Information Exchange, Nogales Port of Entry

FINAL REPORT 535

Prepared by:
Booz Allen Hamilton
101 California Street, Suite 3300
San Francisco, CA 94111

MAY 2004

Prepared for:
Arizona Department of Transportation
206 South 17th Avenue
Phoenix, Arizona 85007
in cooperation with
U.S. Department of Transportation
Federal Highway Administration

The contents of the report reflect the views of the authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Arizona Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation. Trade or manufacturers' names which may appear herein are cited only because they are considered essential to the objectives of the report. The U.S. Government and The State of Arizona do not endorse products or manufacturers.

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FHWA-AZ-04-535(1)		

4. Title and Subtitle	5. Report Date
CVISN Safety Information Exchange, Nogales Port of Entry	May 2004
	6. Performing Organization Code

7. Author	8. Performing Organization Report No.
Taso Zografos	

9. Performing Organization Name and Address	10. Work Unit No.
Booz Allen Hamilton 101 California Street, Suite 3300 San Francisco, CA 94111	11. Contract or Grant No. SPR-PL-1(59)535(1)

12. Sponsoring Agency Name and Address	13.Type of Report & Period Covered
Arizona Department of Transportation 206 S. 17th Avenue Phoenix, Arizona 85007 Project Manager: John Semmens	14. Sponsoring Agency Code

15. Supplementary Notes

Prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration

16. Abstract

The State of Arizona's Nogales Port of Entry (POE) is faced with a growing number of commercial vehicles entering the facility, more stringent security requirements and the need for facility inspectors to readily collect, examine and exchange data for the vehicles and drivers entering the Port. Intelligent Transportation Systems (ITS) technologies are a vital tool in helping to solve this problem. ITS can simplify the task of separating high-risk from low-risk motor carriers and shipments. Advanced knowledge about the driver, shipment, and carrier allows the authorities to make a quick assessment of the risk involved in permitting entry into the United States. Advanced information that is exchanged and the methods of exchanging the vital information between authorities in a timely, cost-effective and secure manner is the means by which the enforcement agencies can conduct their risk assessments and determine which carriers, vehicles, and drivers need to be inspected.

The objective is to assist the State of Arizona in determining the trucking industry's safety and security violators without inconveniencing the compliant vehicles and avoid serving as a roadblock to legitimate trade. Intelligent Transportation Systems (ITS) technologies are a vital tool in helping to solve this problem. ITS can simplify the task of separating high-risk from low-risk motor carriers and shipments. Advanced knowledge about the driver, shipment, and carrier allows the authorities to make a quick assessment of the risk involved in permitting entry into the United States. Advanced information that is exchanged and the methods of exchanging the vital information between authorities in a timely, cost-effective and secure manner is the means by which the enforcement agencies can conduct their risk assessments and determine which carriers, vehicles, and drivers need to be inspected. The ability to identify the high-risk vehicles, drivers and shipments in advance is invaluable to both the inspectors and the freight motor carrier drivers. It not only makes it possible to conduct more thorough inspections, it also allows compliant vehicles to move through the process quickly. With the help of technology, increased security and safety generates faster movement of trade and lowers risk to the motoring public.

17. Key Words	18. Distribution Statement	23. Registrant's Seal
Truck safety, port-of-entry operations, ITS for CVO	Document is available to the U.S. Public through the National Technical Information Service, Springfield, Virginia, 22161	

19. Security Classification	20. Security Classification	21. No. of Pages	22. Price
Unclassified	Unclassified	182	

SI (MODERN METRIC) CONVERSION FACTORS*

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
	LENGTH			
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
	AREA			
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yards	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
	VOLUME			
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
	NOTE: Volumes greater than 1000L shall be shown in m^3.			
	MASS			
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000lb)	0.907	megagrams (or "metric ton")	mg (or "t")
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5(F-32)/9 or (F-32)/1.8	Celsius temperature	°C
	ILLUMINATION			
fc	foot candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
	FORCE AND PRESSURE OR STRESS			
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
	LENGTH			
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
	AREA			
mm^2	Square millimeters	0.0016	square inches	in^2
m^2	Square meters	10.764	square feet	ft^2
m^2	Square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	Square kilometers	0.386	square miles	mi^2
	VOLUME			
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	Cubic meters	35.315	cubic feet	ft^3
m^3	Cubic meters	1.308	cubic yards	yd^3
	MASS			
g	grams	0.035	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams (or "metric ton")	1.102	short tons (2000lb)	T
	TEMPERATURE (exact)			
°C	Celsius temperature	1.8C + 32	Fahrenheit temperature	°F
	ILLUMINATION			
lx	lux	0.0929	foot-candles	fc
cd/m^2	candela/m^2	0.2919	foot-Lamberts	fl
	FORCE AND PRESSURE OR STRESS			
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380

TABLE OF CONTENTS

List of Tables

List of Figures

ACRONYMS & ABBREVIATIONS

ABBCS	Ambassador Bridge Border Crossing Border Crossing System
ACE	Automated Commercial Environment
ADOT	Arizona Department of Transportation
ATA	American Trucking Association
ATIS	Advanced Traveler Information Systems
ATMS	Advanced Traffic Management Systems
AVC	Automatic Vehicle Classification
AVI	Automatic Vehicle Identification
AVL	Automatic or Advanced Vehicle Location
ADEQ	Arizona Department of Environmental Quality
BTS	Border and Transportation Security
CAADES	Confederacion de Associaciones Agricolas del Estado de Sinaloa
CAD	Computer Aided Dispatch
CBP	Bureau of Customs and Border Protection
CCTV	Closed Circuit Television
CDLIS	Commercial Drivers License Information System
CI/CVIEW	Credential Interface/Commercial Vehicle Information Exchange Window
CMS	Changeable Message Sign (also known as VMS)
CVIEW	Commercial Vehicle Information Exchange Window
CVISN	Commercial Vehicle Information Systems and Networks
CVO	Commercial Vehicle Operation
DCL	Dedicated Commuter Lane
DHS	U.S. Department of Homeland Security
DMS	Dynamic Message Signs
DPIU	Data Processing Interface Unit
DPS	Arizona Department of Public Safety
DSA	Drug Screening Area
DSRC	Dedicated Short Range Communication
EDI	Electronic Data Interchange
EPIC	Expedited Processing at International Crossing
ETC	Electronic Toll Collection
FAST	Free and Secure Trade
FDA	United States Food and Drug Administration

FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FOT	Field Operational Test
FTPS	Freight and Trade Processing System
GAO	General Accounting Office
GIS	Geographic Information Systems
GPS	Global Positioning System
HELP	Heavy Vehicle Electronic License Plate
HP	Hewlett-Packard
IBC	International Border Clearance
IBEX	International Border Electronic Crossing
IFTA	International Fuel Tax Agreement
ISM	International Standard Modulation
ISO	International Organization for Standardization
ISS	Inspection Selection System
ISTEA	Intermodal Surface Transportation Efficiency Act
ITG	Information Technology Group
ITS	Intelligent Transportation Systems
LAN	Local Area Network
LPR	License Plate Recognition
MACS	Mainline Automated Clearance System
MCMIS	Motor Carrier Management Information System
MIST	Management Information System for Transportation
MVD	Motor Vehicle Division
NAFTA	North American Free Trade Agreement
NATAP	North American Trade Automation Prototype
NorPASS	North American Preclearance and Safety System
NTCIP	National Transportation Communications for ITS Protocol
OBC	On-Board Computer
OOS	Out-of-Service
OS/OW	Oversize/Overweight
PC	Personal Computer (one based on an Intel chipset)
PDA	**Personal Digital Assistant**
PIQ	Past Inspection Inquiry

POE	Port of Entry
PRISM	Performance and Registration Information Systems Management
RF	Radio Frequency
RFID	Radio Frequency Identification
SAFER	Safety and Fitness Electronic Record
SENTRI	Secure Electronic Network for Travelers Rapid Inspection
SWIM	Slow Weigh In Motion
TEA-21	Transportation Equity Act for the 21st Century
TRAFIC	Traffic Facility Integrated Communications
USDOT	U.S. Department of Transportation
USCS	United States Customs Service
USDA	United States Department of Agriculture
UWB	Ultrawideband
VACIS	Vehicle and Container Inspection System
VMS	Variable Message Sign (see also CMS and DMS)
WiFi	Wireless Fidelity
WIM	Weigh-in-Motion
WLAN	Wireless Local Area Network
XML	eXtensible Markup Language

Executive Summary

The State of Arizona's Nogales Port of Entry (POE) is faced with a growing number of commercial vehicles entering the facility, more stringent security requirements, and the need for facility inspectors to readily collect, examine, and exchange data for the vehicles and drivers entering the Port. Intelligent Transportation Systems (ITS) technologies are a vital tool in helping to solve this problem. ITS can simplify the task of separating high-risk from low-risk motor carriers and shipments. Advanced knowledge about the driver, shipment, and carrier allows the authorities to make a quick assessment of the risk involved in permitting entry into the United States. Advanced information exchanged in a timely, cost-effective, and secure manner allows enforcement agencies to conduct their risk assessments and determine which carriers, vehicles, and drivers need to be inspected.

In order to identify the technologies most appropriate in supporting a connectivity between the vehicles, the roadside, and the administrative office process and systems, this research includes canvassing of the literature related to ITS, Commercial Vehicle Operations (CVO) and Commercial Vehicle Information Systems Network (CVISN).

The Safety Information Exchange Needs Assessment literature review examines literature regarding existing CVISN planning documents, ITS technologies, and implementation literature and POE issues.

Among the more significant lessons learned—not only through the border systems FOTs (Field Operational Test), but across the spectrum with regard to ITS/CVO—has been that technology implementation alone does not guarantee success.

This issue underscores the importance of understanding the operational and institutional constraints and requirements at each specific border site. The best source for this information is the body of stakeholders that routinely engage in activities at a specific crossing.

The implementation plan consists of developing and installing a CVO system using ITS technology at the Nogales International Border POE.

The proposed system will use a system architecture developed as part the FHWA's ongoing CVISN initiative, the FHWA's International Border Clearance (IBC) architecture, the U.S. Custom's Automated Manifest System (AMS), and the ADOT's Expedited Processing at International Crossings (EPIC) project.

The deployment will use proven technology and will be interoperable with federal CVO programs at other border crossings. This is the first phase of a multi-phase project.

I. INTRODUCTION

This work plan contains a summary of the tasks required for completion of SPR 535: Commercial Vehicle Information Systems and Networks (CVISN) Safety Information Exchange, Nogales Port of Entry (POE). This summary includes an overview of the tasks to be completed, a list of proposed questions for the stakeholder surveys, and project benchmarks with expected dates of completion.

This project will assist the State of Arizona in determining the trucking industry's safety and security violators without inconveniencing the compliant vehicles and without serving as a roadblock to legitimate trade. Intelligent Transportation Systems (ITS) technologies are a vital tool in helping to solve this problem. ITS can simplify the task of separating high-risk from low-risk motor carriers and shipments. Advanced knowledge about the driver, shipment, and carrier allows the authorities to make a quick assessment of the risk involved in permitting entry into the United States. Advanced information that is exchanged between authorities in a timely, cost-effective, and secure manner allows enforcement agencies to conduct their risk assessments and determine which carriers, vehicles, and drivers need to be inspected. The ability to identify the high-risk vehicles, drivers, and shipments in advance is invaluable to both the inspectors and the freight motor carrier drivers. It not only makes it possible to conduct more thorough inspections, it also allows compliant vehicles to move through the process quickly. With the help of technology, increased security and safety is achieved, resulting in faster movement of trade and lower risk to the motoring public.

In order to identify the technologies most appropriate in supporting connectivity between the vehicles, the roadside, and the administrative office process and systems, this research will include a canvassing of the literature related to ITS, Commercial Vehicle Operations (CVO), and CVISN. We will also perform a survey that will include, but not be limited to, state transportation professionals, trucking industry representatives, several components of the U.S. Department of Homeland Security's Border and Transportation Security (BTS) Directorate, formerly U.S. Customs, U.S. Department of Agriculture[1], U.S. Department of Transportation Federal Motor Carrier Safety Administration, U.S. Food and Drug Agency, Arizona Department of Transportation (ADOT) Motor Vehicle Division, Arizona Department of Public Safety, trade professionals, the Mexican Secretary for Communications and Transportation, and Mexican Customs. Based on the survey results, an inventory will be developed and recommendation(s) will be made regarding CVISN/ITS service applications. An implementation plan will follow based on final recommendations from the Technical Advisory Committee (TAC) and ADOT, with a final report and presentation to be made once all data have been collected.

[1] *In March 2003, employees from the U.S. Department of Agriculture (USDA) Agricultural Quarantine and Inspection (AQI) program and Animal and Plant Health Inspection Service (APHIS) were consolidated into the Customs and Border Protection (CBP) Field Operations.*

The following outline provides and overview of the how tasks were organized and work completed.

Project Overview

I. Introduction

Task 1 – Work Plan
- Develop final project plan and schedule

II. Data Collection

Task 2 – Literature Review
- Collect and summarize information on ITS technologies and existing CVISN planning and implementation literature.

Task 3 – Survey/Interview Stakeholders
- Identify and interview key stakeholders to capture and document experiences and specific needs at Nogales

Task 4 – Inventory CVISN/ITS Devices, Equipment, and Software
- Identify and collect data on CVISN/ITS technologies, including an inventory of technologies, equipment, and processes currently present at Nogales POE.
- Arrange demonstrations, as possible, for the benefit of ADOT and Nogales stakeholders, and identify lessons learned at Nogales and other locations.

III. Recommendations

Task 5 – Recommend CVISN/ITS Package
- Provide recommendations of CVISN/ITS elements in support of Nogales operations

Task 6 – Develop Implementation Plan
- Based on CVISN/ITS packages, develop a preliminary budget and schedule for future implementation

IV. Project Wrap-Up

Task 7 – Final Report
- A complete report with project data will be prepared and submitted.

Task 8 – Final Presentation
- A final findings and recommendations will be presented to an appropriate group(s) upon request.

II. DATA COLLECTION

1. LITERATURE REVIEW

The Safety Information Exchange Needs Assessment literature review examined existing CVISN planning documents, ITS technologies and implementation literature, and literature regarding POE issues. This review aids in the final assessment of the Nogales POE commercial vehicle processing procedures and equipment in order to recommend automated system components that will improve information sharing and expedite operations for cross border traffic.

Information was gathered and documented from a variety of sources. Upon review, each piece of literature is categorized in the literature database (Appendix B - Literature Database) as either CVISN, ITS, or Port-of-Entry literature. The database includes:

- Title and date.
- Significant Findings.
- Lessons Learned.
- Institutional Issues.
- Operational Issues.
- Summary.

This section of the report includes:

1. Methodology for article selection.
2. A description of the database.
3. Significant findings from each category of literature.
4. Conclusions.

1.1 Methodology

In order to properly research the data needed for this literature review, an extensive Internet search was performed. Several sources of information were researched, including, but not limited to:

- American Trucking Association (including the American Trucking Associations Foundation).
- ADOT.
- California Department of Transportation.
- John Hopkins University (Applied Physics Laboratory).
- San Diego Association of Governments (SANDAG).
- U.S. Customs Service (now under Department of Homeland Security).

- U.S. Department of Agriculture.
- U.S. Department of Transportation (USDOT).
  - Federal Highway Administration (FHWA)
  - Federal Motor Carrier Safety Administration
  - Federal Transit Administration (FTA)
- U.S. Food and Drug Administration (FDA)
- University of Kentucky Transportation Center
- University of Oregon Transportation Center

Utilization of our own resources, including professional contacts and previous work (California Statewide Goods Movement ITS Action Plan), provided adequate data to review for selecting literature. Discussions/meetings with subcontractors were also held to further our research. After a thorough review of our sources, the literature to be reviewed was selected (listed in Tables 2, 3 and 4 in subsequent sections) and sorted according to the previously mentioned categories.

Discussions with stakeholders from ADOT also provided direction on possible sources of existing literature. Specifically, the FHWA's CVISN initiative, ADOT's EPIC phases 1 and 2, and federal Performance and Registration Systems Management (PRISM) program documents were obtained for review.

Within the database, a scale is included as to the relevance of the literature in several categories. The symbols provided display the amount of relevance of the article to the following categories:

- CVISN
- ITS
- Customs
- State
- Federal
- International

Relevance is rated 0-4, as described in Table 1.

Table 1 – Relevance Rating

Relevance Rating	Degree of Relevance
0	**No Relevance**
1	Slightly Relevant
2	Partly Relevant
3	Mostly Relevant
4	Fully Relevant

1.2 CVISN Literature

The CVISN literature reviewed uncovered some key concepts that deserve to be noted (a list of the articles used for this section is provided in Table 2). The safety element of CVISN is a prevailing theme throughout this literature, specifically promoting highway safety. It is also noted that carrier outreach and participation in electronic screening is vital to the success of any new technology program. Carrier outreach should begin at the early stages of development in order to receive the best level of support during the project.

There are many electronic screening technologies mentioned in this literature, including, but not limited to:

- Dedicated Short Range Communications (DSRC).
- Weigh-in-Motion (WIM).
- Automatic Vehicle Classification (AVC).
- Vehicle Tracking Loops.
- Variable Message Signs (VMS).
- Safety and Fitness Electronic Record (SAFER) Data Mailbox (SDM).
- Electronic Data Interface (EDI).
- License Plate Recognition (LPR).

Many of these technologies are being utilized at the Nogales POE, and others are in the planning stages. These and other technologies are beneficial to the POE because they create a more thorough and efficient operation. Implementing additional technologies, as well as shared technologies between the many state and federal agencies at the POE, can aid in the safety, security, and efficiency of processing the information of the commercial motor carrier traffic.

Table 2 – CVISN Literature

Article	Date
CVISN Guide To Electronic Screening (USDOT)	March 2002
Arizona CVISN Top Level Design Description (ADOT)	August 2002
What Have We Learned About Intelligent Transportation Systems: Chapter 6 – What Have We Learned About ITS for Commercial Vehicle Operations? Status, Challenges, and Benefits of CVISN Level 1 Deployment (Battelle)	December 2000
Evaluation of the Commercial Vehicle Information Systems and Networks (CVISN) Deployment Initiative (Battelle for USDOT ITS Joint Program Office)	March 2002
Memorandum of Understanding between The Arizona Department of Transportation (ADOT) and The Arizona Department of Public Safety (DPS) The United States Customs Service (USCS) The United States Department of Agriculture (USDA) The United States Department of Transportation (USDOT) – Federal Motor Carrier Safety Administration (FMCSA) The United States General Services Administration (USGSA) Expedited Processing at International Crossings (EPIC) Phase 2 Commercial Vehicle Operations/Traffic Management System Nogales, Arizona Port-of-Entry - Mariposa Federal and State Complexes (ADOT)	August 2002
CVISN - Executive Summary Model Deployment Initiative (MDI) Summary Evaluation Plan (Battelle for USDOT)	July 1998

1.3 Intelligent Transportation Systems (ITS)

The majority of articles for this literature review were oriented towards ITS. Many of those articles (listed in Table 3) are evaluations, assessments, or field operational tests (FOT) of certain systems or specific border crossings in the United States.

Integrating a new system or technology into existing ones was a prevalent theme in several of the articles. Travel time and fuel consumption are two other common themes. New and/or improved technologies in electronic screening and/or trucks equipped with transponders were significant in many of the evaluations. There are many technologies in the marketplace, and they are changing and improving, frequently leading to many challenges that arise when determining which technology is best for any given border. Some of the challenges mentioned in these articles include:

- Funding constraints.
- Dealing with multi-agencies (each having a different focus or need).
- When a site does install a new technology, the agency (ies) do not use that new system or do not utilize all of its capabilities.
- Which technology to use.
- Standards for use.

Table 3 – ITS Literature

Article	Date
Intelligent Transportation Systems at International Borders – A Cross-Cutting Study (U.S.FHWA/Federal Transit Administration)	April 2001
ITS Sheet 6: ITS Puts Freight Information Ahead of Freight Movement (FHWA-OP-01-013)	2001
Ambassador Bridge Border Crossing System (ABBCS) Field Operational Test (Booz Allen Hamilton)	May 2000
General Accounting Office Customs Service Modernization Management Improvements Needed on High-Risk Automated Commercial Environment Project (U S. GAO)	May 2002
Arizona PRISM Implementation Project Plan (ADOT)	April 2000
DRAFT VERSION D.2 Commercial Vehicle Information Systems and Networks (CVISN), International Border Clearance (IBC) and National ITS Architecture Alignment (John Hopkins University for FMCSA)	December 2001
International Border Electronic Clearance (IBEX) Test and Evaluation Strategy (U.S. Federal Highway Administration)	February 1996
Advantage I-75 Mainline Automated Clearance System (MACS) (USDOT/Iowa State University)	August 1998
Oregon Green Light CVO Evaluation Final Report (Transportation Research Institute, Oregon State University)	April 2001
International Border Electronic Clearance - IBEX, Evaluation Report (Booz Allen Hamilton)	July 1998
Coutts / Sweetgrass Automated Border Crossing Phase I (State of Montana DOT and U.S. FHWA)	March 1999
EPIC Expedited Processing at International Crossings - Evaluation Final Report (Western Highway Institute and SAIC)	September 1998
A Guide to Developing a Regional ITS/CVO Coordination Plan (U.S. Federal Highway Administration)	August 1997
Expedited Processing and International Crossing (EPIC) Test & Evaluation Strategy (U.S. Federal Highway Administration)	February 1996
Electronic Cargo Seals: Context, Technologies, and Marketplace (Michael Wolfe, North River Consulting Group)	July 2002
Final Report Assessment of Automated Data Collection Technologies for Calculation of Commercial Motor Vehicles Border Crossing Travel Time Delay (Battelle for Federal Highway Administration)	April 2002
Statewide ITS Architecture Development A Case Study - Arizona's Rural Statewide ITS Architecture (FHWA, FTA)	September 1999

1.4 Port-of-Entry

The final category of articles (Table 4) focuses on literature regarding POEs. While many of the articles in the previous two categories mention specific POEs, there is more focus on CVISN or ITS information in this category of articles. There were not many sources for POE operations. Many of the articles can be cross-referenced for the purpose of this literature review.

The POE articles concentrate on more efficient and effective processing for trucks that come into the United States. The articles are concerned with integrating state-of-the-art information systems that identify, weigh, classify, and provide instruction to commercial vehicles prior to entering the ports.

Table 4 – Port-of-Entry Literature

Article	Date
Marketing Winter Vegetables from Mexico (USDA)	April 1998
2001 Assessment of Truck Travel Time & Delay at 7 International Ports-of-Entry - Report Summaries (FHWA) Measurement of Commercial Motor Vehicle Travel Time and Delay at U.S. International Border Stations (FHWA) http://www.ops.fhwa.dot.gov/freight/pmeasure/index.htm	2001
Port-of-Entry Advanced Sorting System (PASS) Operational Test Final Report (US FHWA and Oregon DOT)	December 1998

1.5 Conclusion

An overview of the current resources available, focusing on ITS technologies, existing CVISN planning and implementation literature, and POE issues has been presented in the previous sections. However, new technologies are always being developed and existing technologies are being improved. Government programs at the state and federal levels are also under review and new directions may be considered for ITS/CVO technologies.

Major topic areas of concern for the Nogales POE include the following:

1. Participation by the motor carrier community is essential to achieve long-term success. Carrier outreach should begin in the early stages of development in order to build support for any program. Providing an incentive to the carrier could help in establishing their participation and their support.

2. How much funding is required to complete the project? A thorough knowledge of all funding options and sources will assist in a successful CVISN project. Questions to answer in this process can include:

   - Where will the funding be obtained?
   - How will operations and maintenance costs be funded?
   - What type of procurement should be used for each product?
   - What can be done to expedite procurements?

3. The application of electronic screening will be affected by many constraints. Site limitations, availability of support staff and funding are a few of the possible constraints. Each POE has a unique design, Nogales included, because of:

- State policy and practices.
- Traffic flow, volume and number of lanes.
- Availability site space.
- Legacy systems characteristics.
- Existing proprietary solutions.
- Resources available for making changes.

4. The North American Free Trade Area (NAFTA) presents many issues, including:

   - Formalization of a federal-state presence at border crossings.
   - Adoption of specific port improvement recommendations.
   - Collaboration between state and federal inspection authorities in the sharing of resources and the joint assignment of port inspection.

5. Wireless communication capabilities for the project is another area of concern. In the *Arizona CVISN Top Level Design Description*, it is noted that Arizona does not have wireless communication in place for real-time inquiries or immediate upload of inspections to the Safety and Fitness Electronic Record - Data Mailbox (SDM) from the roadside. This type of wireless capability could be beneficial to Arizona's CVISN program.

6. CVISN can produce substantial cost savings for states and motor carriers, improve the efficiency and fairness of commercial vehicle operations, and most importantly save lives. CVISN must be deployed nationwide for these results to happen.

7. CVISN safety information exchange and electronic screening technologies can result in significant safety benefits, but only if these technologies are widely deployed, fully integrated, and combined with innovative enforcement and outreach strategies.

8. Information management is not unique to the border environment, and receives regular attention in most ITS and COV forums. The primary issue here stems from the concern on the part of the carrier community regarding the collection, use, and protection of information not specifically required by law, and liability regarding inaccurate data.

9. Electronic screening will reduce travel time and fuel consumption for trucks participating in these programs, or transponder-equipped trucks. Electronic screening has the potential to decrease the occurrence of unobserved bypasses resulting from full queues and increase the percentage of trucks being screened for safety and compliance.

10. Use of "smart cards" to confirm the identity of the driver using a sorted thumbprint and to provide information about the seal on the cargo being transported will allow for a higher level of efficiency and security of the freight as it is shipped from its origin to its destination. Using electronic container seals (e-seals) to monitor the security of containerized freight across international borders can help to automate clearance and credentialing of commercial vehicles through ports and terminals. Electronic seals have the potential to improve both freight transportation security and productivity. Previous trials of electronic seals have been successful in decreasing congestion and operating costs by providing information that allows freight movement organizations to identify and avoid transportation bottlenecks.

With these issues in mind, Arizona's POE at Nogales has the potential to be a model port utilizing a sophisticated CVISN system. There is a high volume of commercial traffic making use of the Nogales port, causing congestion and delays in the processing of motor carriers through the various agencies. A more thorough and efficient automated procedure for processing the carrier's information will be needed to eliminate any further delays.

It should be noted that homeland security is one other issue that was explored. With the developments of September 11, 2001, homeland security has become a priority for all border sites across the county. Homeland security is such an evolving and developing issue that it was difficult to find substantial literary documents to review. Several news stories from various sources were researched and examined, however, none were focused specifically on border concerns and ITS to have made them relevant to this literature review. At this time CBP (Spell out) is in the process of deployment or have future plans for installment in the near future along the U.S./Mexico border technology tools such as:

- **Free and Secure Trade program (FAST) –** FAST provides expedited processing for participants that qualify under the stringent terms of the program. The program also requires the foreign manufacturer to use high security seals properly placed in the approved manner when crossing the border. ADOT is in the process of merging the ITS EPIC2 project with the FAST program.

- **Secure Electronic Network for Travelers Rapid Inspection (SENTRI) –** SENTRI establishes a dedicated commuter lane system and an automated system that allows motorists at selected southern land border ports to enter the United States.

- **Automated Commercial Environment (ACE) –** ACE is an Internet-based portal designed to provide easy-to-use access to consolidated border processing information.

2. STAKEHOLDER INTERVIEWS

Various federal and state motor carrier safety information systems have been available to the Nogales POE, but are neither installed nor being used at the Nogales commercial POE. This impedes the ability for all commercial vehicle safety inspectors to capture, communicate, and collect data pertinent to vehicles and the drivers they are examining. The inability of truck inspectors to have immediate access to required records may lead to potential accidents or allow problem drivers to operate commercial vehicles.

The lack of timely vehicle and driver information at the Nogales inspection facility will have an impact on its ability to operate at its full potential. This can affect the ability of both state and federal motor carrier inspectors to maintain required truck and operator safety standards.

In the process of determining the best plan of action for the Nogales POE, the key stakeholders must be interviewed/surveyed to obtain their perspectives on how the operations and safety at the Nogales inspection facility might be improved via CVISN and ITS related technologies.

Among the more significant lessons learned—not only through the border systems FOTs (Field Operational Test), but across the spectrum with regard to ITS/CVO—has been that technology implementation alone does not guarantee success. Because most ITS/CVO implementations have

depended, and will continue to depend, on voluntary participation on the part of carriers and on the support of the enforcement community, care must be exercised in selecting technology and process solutions. To be considered a viable, long-term approach, any such solution must take into consideration the needs and desires of the user community.

This is particularly true in the border-crossing environment, where location-specific demographic characteristics of the user population are extremely important in identifying deployable solutions. For example, solutions that work well at locations like the Ambassador Bridge outside Detroit, Michigan, where the movement of auto parts and completed automobiles between various manufacturing facilities are accomplished in a closed-loop, may not work well at locations like Nogales, where seasonal produce shipments via small local carriers constitute a significant portion of the traffic. Further, concerns regarding the safety of non-U.S. vehicles are much more pronounced along the southern border than in the states that border Canada, where random selection of vehicles for inspection is severely limited.

These issues underscore the importance of understanding the operational and institutional constraints and requirements at each specific border site. The best source for this information is the body of stakeholders that routinely engage in activities at a specific crossing. For this study, we have interfaced directly with representatives from key stakeholder groups, relying on existing relationships to capture the location-specific needs and expectations of each.

Interviews with staff members at both the state and federal levels are the basis for this portion of the assessment. Key interviewees included:

- U.S. federal government entities.
- Arizona state government entities.
- Mexican federal government entities.
- Customs brokers.

Interviews with these stakeholders provided the perspectives of those personnel involved with the port operations and those in direct contact to shape the final assessment findings and recommendations.

Included in this section of the report is the methodology and significant findings gathered from the interviews. The details of the survey instrument and detailed interview summaries are included in Appendix C - Survey Questions, and Appendix D - Interview Summaries, respectively.

2.1 Methodology

This section describes the process of identifying the interview population, developing the interview guides, conducting the interviews, and deriving the findings.

In order to properly evaluate and address the needs of the Nogales POE in terms of an operations and safety information exchange system under the umbrella of CVISN and ITS related technologies, an extensive list of key public and private stakeholders was developed with the assistance of the TAC. Those identified stakeholders have an interest in the policies, procedures, and operations that take place at the port.

Working closely with the TAC, it was determined that the interviewee list should be limited in scope and involve only the principals of those groups and individuals with a direct connection to the port. The following (Table 1) is a list of those who were contacted for interviews.

Table 5 - Principal Stakeholders

Agency	Name	Title
U.S. Federal Motor Carrier Safety Administration	Eric Ice	Division Administrator
U.S. Federal Motor Carrier Safety Administration	Max LeBleu	Safety Program Manager
U.S. Federal Motor Carrier Safety Administration	Alan D. Vitcavage	Federal Program Specialist
U.S. Federal Motor Carrier Safety Administration	Paul De La Ossa	Border Supervisor
U.S. Federal Highway Administration	Ed Stillings	Field Coordinator
Bureau Customs and Border Protection (formerly U.S. Customs Services)	John O' Reilly	Assistant Director
Bureau Customs and Border Protection (formerly U.S. Customs Services)	Celia De La Ossa	Chief Inspector, Cargo
U.S. Department of Agriculture	Manny Trujillo	Nogales Port Director
U.S. Food and Drug Administration	Adrian Garcia	Nogales Port Director
U.S. General Services Administration	Ron Sandlin	Property Manager
Secretaría de Comunicaciones y Transportes (Mexico)	Teodoro Echeverria Ortiz	Deputy Administrator for the State of Sonora
Mexican Customs Services	Rudolfo Torres	
Confederacion de Asociaciones Agricolas del Estado de Sinaloa (CAADES)	Evangelos Demetrius	
Arizona Department of Transportation – Motor Vehicle Division	George N. Bays	Coordinator, Special Border Projects
Arizona Department of Transportation – Motor Vehicle Division	Doug Holler (Richard S. Saspe – retired-interviewed prior to retirement)	Lieutenant
Arizona Department of Transportation – Transportation Planning	Dale Buskirk	Director of Transportation Planning, Policy and Programming

Agency	Name	Title
Arizona Department of Transportation – Traffic Operations Center	Manny Agah	Manager
Arizona Department of Transportation	Dave Phillips – resigned after interview was completed	CVISN/PRISM Program Manager
Arizona Department of Public Safety	Ursulla Miller	CVISN Liaison
Arizona Department of Public Safety	Rob Cahoon	Administrative Sergeant Criminal Justice Support Division
Arizona Department of Agriculture	Cindy Dahn	Field Operations Manager
Arizona Department of Environmental Quality	Edna Mendoza	Hazardous Waste Coordinator
Arizona Motor Transport Association	Karen Rasmussen	President
Arizona Department of Transportation – Motor Vehicle Division	Kathleen Morley	Assistant Deputy Director – Motor Carrier and Tax Services
Pacific Brokerage	J.B Hanson	Supervisor
Michael I. Capin Brokerage	Michael Capin	Supervisor

CVISN – Commercial Vehicle Information Systems and Networks
PRISM – Performance and Registration Information Systems Management

Interviews were not completed for all those listed in Table 5. Reasons for not obtaining an interview ranged from the stakeholder not having time in their schedule, to not responding to our requests for interviews for reasons unknown to us. In addition, there were individuals that were receptive to the ideas of evaluating the specific needs in terms of an operations and safety information exchange system under the umbrella of CVISN and ITS technologies. In these specific circumstances, a survey was sent via e-mail, however the survey was not returned or completed after this initial contact. The agencies that were not able to complete the interview process include:

- Arizona Department of Agriculture.
- Arizona Motor Transport Association.
- Arizona Motor Carrier Association.
- U.S. General Services Administration.
- Secretaría de Comunicaciones y Transportes (Mexico).
- Mexican Customs Services.
- Confederacion de Asociaciones Agricolas del Estado de Sinaloa (CAADES).

The survey instruments were designed to elicit thoughtful and constructive observations on the responsibilities and realities of the Nogales port. In developing the questions, the main goal was to obtain the perspective of stakeholders about how operations and safety (including security) might be improved at the Nogales POE via CVISN and ITS related technologies.

Several themes were created to encompass all of the relevant information that could potentially be taken from each interview. Those themes include:

- Familiarity with CVISN/ITS/CVO initiatives.
- Understanding the stakeholders operation/business focus and the connection with the Nogales POE.
- Historical observations of changes at Nogales POE and any impact to the stakeholder operations.
- Key areas of concern as it revolves around operation at the Nogales POE.
- Changes/enhancements necessary or desired for Nogales POE.
- Additional concerns, suggestions, or recommendations for the Nogales POE.

Interviews were envisioned to obtain the perspective from both public and private stakeholders. While a standard list of questions was created, those questions were tailored to each specific interview based on who and what organization/entity was being interviewed. However, the themes remained consistent throughout the interview process. Appendix C - Survey Questions, contains the survey instrument used for the interviews.

Consistency was also guaranteed by conducting each interview with one of two interviewers:

- Taso Zografos.
- Walter Gonzales.

Upon reviewing each interview, we found common themes among the responses given. The problem statement, the interviewee population, and the interview findings indicated an internal perspective for this portion of the project. Each member of the population has a common goal of having the system work as effectively and efficiently as possible, taking into account border safety and security. This perspective includes the following viewpoints:

- How staff members perceive their knowledge of CVISN/ITS/CVO initiatives.
- Their understanding of their operation and its connection with the Nogales POE.
- How to effectively and efficiently operate the Nogales POE.

Transcripts of all 17 interviews are contained in Appendix C - Survey Questions.

2.2 Findings And Recommendations

This section presents a summary of CBP's mission, and the principal interview findings and recommendations derived from the interview process.

While each POE within CBP is not the same, they do share the same mission statement and goals. As stated in the CBP website, “It is the goal of CBP to provide the American public with greater security and facilitate the flow of legitimate people and goods across the United States border. As its primary mission, CBP will focus on preventing terrorists and terrorist weapons from entering the country.”

Specific to the POE, the same website states, "Ports of Entry are responsible for all daily operational aspects of the Customs Service. Ports of Entry are responsible for maintaining a focus on trade compliance (imports/cargo), passenger operations, outbound operations (exports) and anti-smuggling/canine."

A summary of Customs' mission indicates that safety and security are the main focus and they are taking an active role in ensuring safety and security. Our interviews have yielded responses that support this goal. Other issues in regard to the operation of the port included:

- Technological advances.
- Truck congestion.
- Land use.
- Electronic sharing of information.
- Homeland security.
- Traffic management.
- Redundancy in systems.
- Size of the facility.
- Pre-sorting of carriers.
- Utilizing one consistent "system."
- Processing cargo.

These concerns deal mainly with the internal structure and functioning of the Nogales POE. Categorizing these issues would place them in categories similar to the following:

- Safety.
- Security.
- ITS.
- Leadership.
- Facility management.
- Operations efficiency.

While there are several areas that were brought to our attention as needing improvement, there were also many areas that are seen as the port's strengths. The following are some quotes from the interviews illustrating areas of perceived strength.

- Commercial traffic management:
  - "The trucks come into the United States and go through a quick inspection immediately after crossing."
  - "Trucks are either directed to the Superbooths or to the inspection compound. The inspector at the Superbooth reviews their paperwork. The papers are bar-coded for a quick scan of their information."
  - "The compound has been completely redesigned and reconfigured. The compound is now much faster and more efficient."
  - Customs currently has a queuing management system in place that allows an automated means to determine traffic queuing time. This is currently in the passenger vehicle area and they hope to implement it in the cargo operations.

- Operations efficiency:
  - "The U.S. Customs Service is always trying to find ways to improve their operations and systems at the port…"
  - "The port is more adaptable to changing conditions than most ports, testing new ideas, policies, approaches, and procedures."
  - "Nogales is much faster and more efficient at processing trucks than other ports. The trucks are able to pass through faster than they did five years ago."
- ITS:
  - "There has been a large amount of new technology coming into the compound in the last five -six years, most of it coming in on the inspection side of the operations."
  - "(The Federal Motor Carrier Safety Administration is required to) check every license before entering the country, using a PDA (personal digital assistant) and (front line inspectors) have a PDA to determine if the carrier should be tagged to be inspected."

In addition to those high points, there are also areas where suggestions for change were given. Below, we describe the findings and subsequent stakeholder recommendations for each topic of concern.

2.2.1 Land Use/Traffic Management

Historical observations have shown that over the past five to 10 years, there has been an increase in the number of trucks coming across the border. This leads to the issue of land use planning. or the lack thereof, at the Nogales Port. One of the shortcomings is that there are several hills and valleys that make it difficult to expand the facility. The physical constraints at the port have created additional challenges to implementing the new technology.

The increase in the number of trucks has created a need for an additional lane or lanes for the commercial portion of the border crossing. It was noted that utilizing the space at Nogales should be better planned as it related to moving trucks through the compound. The topic of relocating the passenger processing area west of its current location, and allowing that space to be used for commercial operations, was also brought to our attention. However, it specifically noted that this modification is only in the discussion stage.

2.2.2 Electronic Sharing of Information

Most, if not all, interviews brought out the topic of sharing information electronically between agencies involved in port operations. Electronic sharing of information would expedite port operation by creating one common database where all data is stored and accessed by all agencies involved at the port. The obstacle is how to keep confidential information out of the hands of those agencies that do not need access to it. In other words, how can relevant information about the trucks, the carriers, the drivers, and the cargo be shared between agencies without revealing certain information that certain agencies do not need to view? The requesting agency would like to have the ability to extract specific data from a common database without viewing all of the data that is being stored. There appears to be networks and technologies that are currently

available, but the question is how to bring them together to make it work effectively and efficiently for Nogales. Technological improvements at the port are a major issue for most agencies. One interview summed it up as follows, "Technology should be the major area of concern. All of the agencies that currently have operations at the port should find a way to work together on the same system."

2.2.3 Size of the Facility/Operations

As previously mentioned, land use is an area of concern brought to light in several interviews. The layout of the land that the compound sits on has created impediment to expanding the size of the port. However, lack of space has led to other noted shortcomings in the size of the facility. There is a need for examination space for the cargo being carried into the United States. There is a specific need for more space to examine trucks carrying hazardous materials and waste. Another interview noted that the size of Nogales' port, the largest in Arizona, could be a shortcoming to the state since other border crossings in the Southwest are two to three times larger and have a lower number of trucks coming across their borders.

The size of the facility leads to the level of effectiveness of its operations. One interview noted that in order to accommodate the high volume of trucks coming through during the peak season, there should be a consideration to extend the hours of operation. This could be done in place of constructing a new lane that may not be completely utilized during the off-peak period. Overall, the agencies that are currently working at the port needs to be coordinated to allow them to effectively and efficiently utilize one consistent system that will be implemented to allow those agencies to operate at their highest potential. This is best summed up in the following interview response: "A consensus needs to be put in place with all the different players that are in place at the Nogales port. Everyone needs to get together to define the objectives of the port and note who is doing what activity, how they are carrying out those activities, and what is their primary focus. The port currently has too much overlapping of processes and procedures."

2.2.4 Homeland Security

The subject of Homeland security has become a pressing issue with recent events. This was not specifically addressed in the survey instrument. However, the topic was brought to our attention by several of the stakeholders. Now that the U.S. Customs Service is under the purview of the U.S. Department of Homeland Security, stakeholders have a heightened awareness of border safety. There have been changes in focus for some agencies. Attention is now being directed to anti-terrorism at our nation's borders. Homeland security will be considered during the remaining tasks, as outlined for this assessment. Specifically, the technologies inventory and the implementation plan will address this issue in more detail.

2.3 Conclusion

Through these findings and recommendations, stakeholders are looking for leadership, responsiveness, collaboration, and relationship building from their respective agencies as well as those who are working in direct relation with the port's operations. Improving these aspects of Nogales POE operations, will improve the overall performance of the port and its staff.

3. INVENTORY OF CVISN/ITS SERVICE APPLICATIONS

The purpose of Task 4, Safety Information Exchange Needs Assessment, is to provide an inventory of existing and emerging ITS technologies that could support and help improve operations at the Nogales, Arizona, commercial vehicle POE. This includes assessing the port's commercial vehicle processing procedures and equipment in order to recommend system components that will help improve information sharing and expedite operations for cross-border commercial traffic.

3.1 Methodology

Operations procedures at the Nogales POE were studied and documented in order to identify potential areas of improvement. This research involved a number of visits to the port compound, as well as interviews with key personnel from the various agencies represented there, including:

- ADOT.
- Arizona Motor Vehicle Division (MVD).
- Arizona Department of Public Safety
- Arizona Department of Environmental Quality (ADEQ).
- U.S. Customs Service, recently moved under the Bureau of Customs and Border Protection (BCP).
- United States Department of Agriculture (USDA), now under the direction of CBP.
- U.S. Federal Highway Administration (FHWA).
- U.S. Federal Motor Carrier Safety Administration (FMCSA).
- U.S. Food and Drug Administration (FDA).

In addition, the Booz Allen team reviewed the port's existing plans for upcoming technology improvements in order to uncover any gaps and identify specific technologies or products.

Operations At The Nogales POE

The Nogales POE is located at the Mariposa Road border crossing on State Route 189 about 65 miles south of Tucson, Arizona, and is the primary crossing point for northbound commercial vehicles leaving the Mexican state of Sonora. According to research conducted under the Nogales CyberPort Project, the wide variety of commodities passing through the port include agricultural products (fresh fruits, vegetables and nuts), portland cement, industrial chemicals, optical and photographic equipment, machinery, and motor vehicle equipment. Among these, the primary imports in terms of volume are agricultural products (34%) and portland cement (18%). The great majority of these imports are destined for Arizona (71.6%), with a significant portion bound for California (16.4%)[2].

Typical daily hours of operation at the port are 6 a.m. to 10 p.m., during which as many as 1200 commercial vehicles may cross the border. However, since fresh agricultural products make up a large portion of the imports through Nogales, the port experiences a seasonal peak between October and June, during which hours are extended to accommodate as many as 1500 vehicles per day.

---

[2] *Nogales CyberPort Project: Alternative Trade Flow Projections and CyberPort Concept Models. Wilbur Smith Associates, December 2002. Pages 4-9*

The U.S. inspection compound for northbound commercial vehicles is roughly 50 yards past (i.e., north of) the U.S.-Mexico border. See Figure 1. Northbound commercial vehicles cross the border in one of four dedicated lanes that are separated from non-commercial traffic. The four lanes merge into two inspection lanes. Commercial vehicles are first stopped at a traffic signal where the driver and the cab door are digitally photographed. A record of the incoming vehicle is created in the port's information system and the picture is included in the record for easier identification. Each vehicle is then allowed to proceed forward and is weighed while traveling at low speed using Weigh-in-Motion (WIM) technology. Shortly after being weighed, the vehicle approaches the first inspection point, the Drug Screening Area (DSA), where it stops to be inspected by CBPagents. The CBP agents perform a visual inspection of the vehicle, sometimes utilizing trained dogs to detect illegal contraband. Vehicles then proceed to the next inspection stage where they will enter the "Superbooth." A License Plate Recognition (LPR) camera captures the vehicle's license plate number as it enters the Superbooth. The Superbooth enclosure contains officers from Arizona's Motor Vehicle Division (MVD) as well as CBP and FMCSA agents. At this point, the driver and vehicle are checked for proper licensing, credentials, and insurance. Each agency has its own separate computer terminal on which to enter, obtain, and verify information. Since some of the truck drivers cross the border frequently and are trusted by the agents, the inspection process can stop here so that the vehicle can go on its way. This is referred to as "Rapid Enforcement." The Nogales POE reports that approximately 60% of commercial vehicles enter the country through Rapid Enforcement.

Any vehicle that has been referred for further inspection is directed by a Variable Message Sign (VMS) to enter the compound and proceed to either the vehicle inspection area or the cargo inspection area. If a vehicle is referred for both inspections, the cargo inspection takes precedence.

During cargo inspections, vehicles are entirely unpacked in order to view the contents. This is both a space- and time-consuming exercise. Since so much of the imports through Nogales are agricultural in nature, the cargo inspection area is staffed with agents from the FDA, the CBP and the USDA Animal and Plant Health Inspection Service.

Vehicle inspections, conducted by the FMCSA, check the vehicles for general safety and road-worthiness.

Once these inspections are complete, and the vehicle is approved, it is free to exit the compound and proceed into the United States.

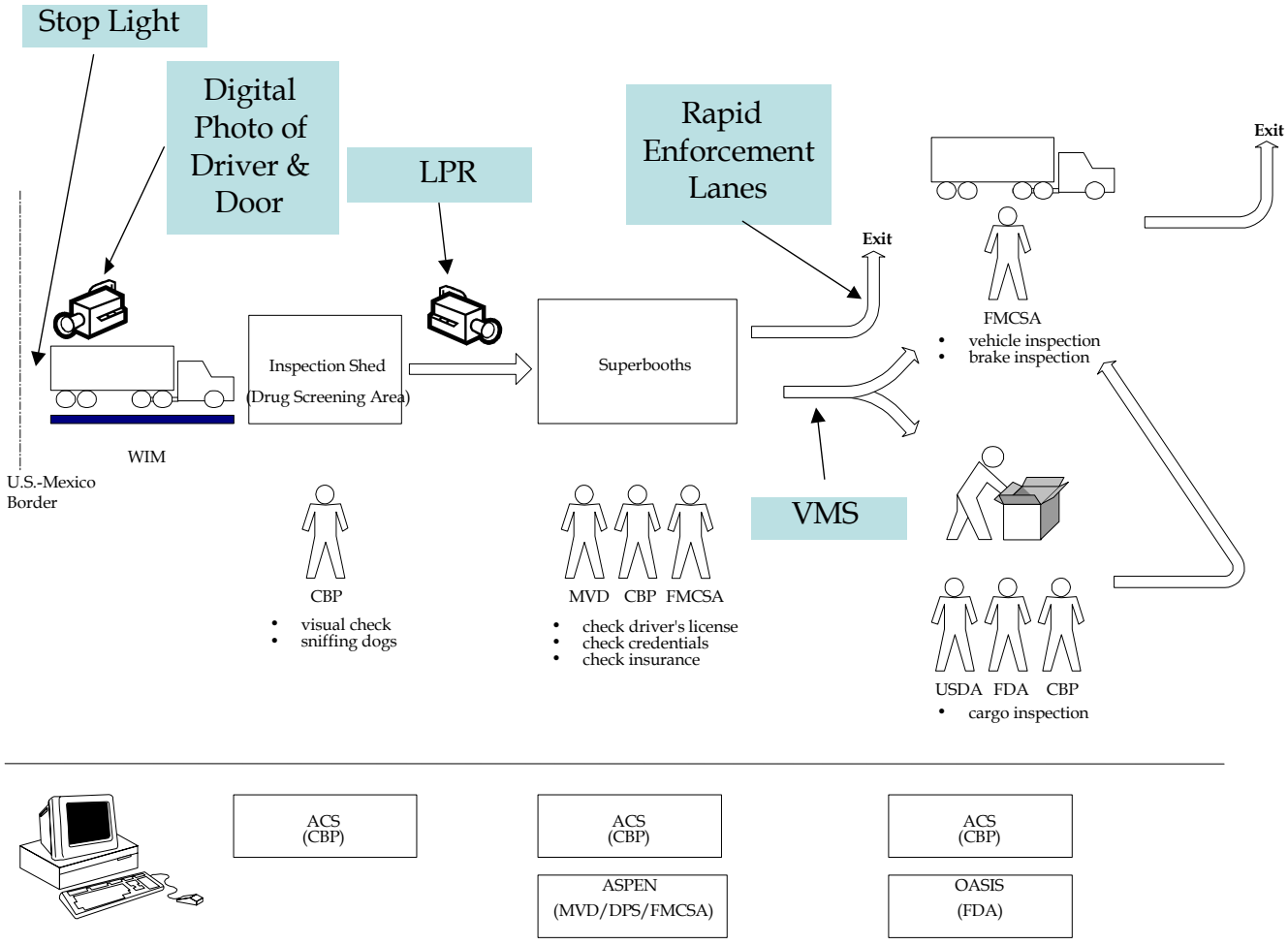


Figure 1 – Process at the Nogales, AZ International Commercial Vehicle Port-of-Entry

3.2 Technology Listing By Category

The analysis of the port's operation, and its plans for upcoming technology improvements, directed our search for technologies, products and vendors. Technology areas focused on include:

- Vehicle to Roadside Communications/Electronic Data Interface (EDI).
- Local Area Networks (LANs).
- Local software applications/hardware platforms.
- Weigh-in-Motion (WIM).
- Variable message signs (VMS).
- License Plate Recognition (LPR).
- Electronic cargo seals (e-seals).

Many of these technologies are being utilized at the Nogales port and others are in the planning stages. These and other technologies are beneficial to the port by creating a more thorough and efficient operation. Implementing additional technologies as well as sharing technologies among the many state and federal agencies involved on the compound can aid in the safety, security, and efficiency of processing the information of the commercial motor carrier traffic.

A sampling of products and vendors, by category, is provided in Appendix E - Vendors And Product Sheets. Note that this is only a representative sample, and there are possibly dozens of other vendors available. The following text provides a short synopsis of the products and vendors found during our search.

3.2.1 Vehicle to Roadside Communications/Electronic Data Interface (EDI)

Vehicle to Roadside Communications and EDI enables the exchange of data between the vehicle and the surrounding infrastructure. In a commercial vehicle application, this data might include items such as:

- Identity of the driver.
- Origin, destination of the cargo.
- Contents of cargo.
- Diagnostic information about the vehicle.

There are a number of technologies that could be used to achieve vehicle to roadside communications, but the most popular in the commercial vehicle environment are radio frequency (RF) transponders. Examples of commercial systems and vendors that provide RF transponders include:

- E-Zpass.
- PrePass.
- TeleNexus.
- TransCore's SmartWatch framework and Amtech tags.

E-Zpass

E-Zpass' transponders, initially used specifically for electronic toll collection, now also provide functionality for prescreening commercial vehicles at state POEs. This helps eliminate the need for multiple transponders. E-Zpass is primarily marketed in the mid-Atlantic region and the Northeast. Figure 2 below is a depiction of the multi-jurisdictional corridors that support the E-ZPass system.

Figure 2 – E-ZPass Multi-Jurisdictional Corridor Network

(Note: Filled-in circles with letters represent service center operations)

PrePass

The PrePass service, which uses RF transponders, is already in use in many parts of the country, including Arizona. The map below shows current PrePass deployment sites. PrePass provides commercial vehicle prescreening at state POEs. Figure 3 below depicts the network of the PrePass system as it is deployed to date.

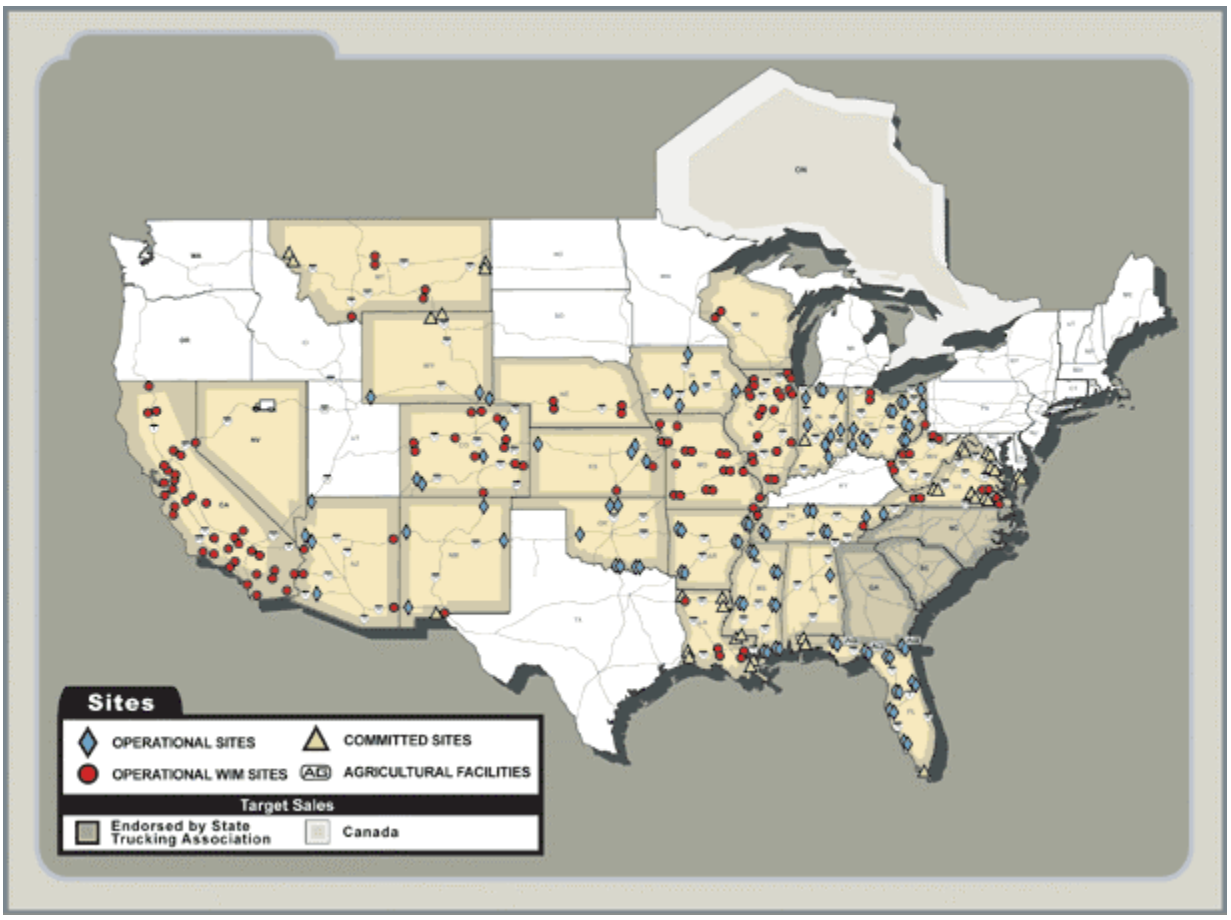


Figure 3 – Prepass Network

TeleNexus

TeleNexus is a maker of Automatic Vehicle Identification (AVI) tags for toll collection and vehicle tracking. One unique security feature is that the tag is deactivated when removed from the vehicle's windshield.

TransCore/Amtech

TransCore provides perhaps the most complete offering of products and services for commercial vehicle port operations. TransCore markets Amtech transponders as well as "eGo" adhesive

sticker tags. The eGo tags are read/write-capable and can hold 128 bytes of information. Please refer to the TransCore information sheets in Appendix E - Vendors And Product Sheets for more information. Figure 4 below depicts several options of transponders for vehicles.

Figure 4 – Sample Transponder Types

3.2.2 Local Area Networks (LANs)

Conventional wireline networks are beginning to give way to the use of wireless networking technologies. Wireless LAN (WLAN) technologies offer reduced installation and operations costs through the elimination of conduit and cabling; however, interference and security can be a concern. The leading WLAN technologies are:

- Bluetooth.
- Wireless Fidelty, or WiFi.
- Ultrawideband, or UWB.

Bluetooth

Bluetooth is a relatively new wireless networking standard that enables a wide range of devices to communicate and exchange data. For example, Bluetooth can be used to wirelessly and seamlessly exchange data between a desktop workstation and a cell phone or PDA.

Bluetooth works in the 2.56 GHz ISM (International Standard Modulation) band using spread spectrum frequency hopping for tight security and high immunity from interference. It has an operating range of up to about 10 meters, so it is best suited for interconnecting items in close proximity. There are possibly hundreds of companies that sell products that utilize or support the use of Bluetooth.

WiFi

WiFi, short for Wireless Fidelity, is another wireless networking standard that relies on the Institute of Electrical and Electronics Engineers (IEEE) 802.11a and 802.11b specifications. The 802.11b specification utilizes the 2.4 GHz band to wirelessly transmit data at approximately 11 Mbps over an indoor distance of up to several hundred feet or an outdoor distance of up to tens of miles. The 802.11a specification uses the 5 GHz band to transmit data at 54 Mbps at typically

shorter distances. The actual transmission distance for either standard depends on impediments, materials, and line of sight.

Because of its range and data transmission rates, WiFi would seem better suited for WLAN applications; however, there have been several reported incidents of hackers "eavesdropping" on WiFi radio transmissions. In most cases, this is because the user has failed to activate WiFi's built-in security features.

The 802.11b specification includes "Shared Key" authentication and Wired Equivalent Privacy (WEP) encryption. Most products offer these security measures, but surveys indicate that nearly 70% of today's WiFi users fail to activate them at the time of installation.

UWB

UWB, or ultrawideband, is an emerging technology based on the IEEE 802.15 specification. This high-bandwidth technology is envisioned for connecting personal computers (PCs) to home electronics and appliances, and, as such, should not directly compete with technologies based on the 802.11 specifications. UWB is not expected to be available commercially until late 2004 or into 2005.

3.2.4 Local Software Applications/Hardware Platforms

UNIX-based systems have historically been preferred over PC-based systems for mission-critical services because of their greater reliability. However, recent improvements in PC operating systems (namely Windows 2000 and Windows XP) have made them significantly more reliable, and now a more cost-efficient alternative. The typical Sun or HP UNIX-based workstation can cost from $8,000 to $20,000, compared to a $1000-$3000 Windows-based PC.

3.2.5 Weigh-in-Motion (WIM)

WIM scales enable a truck to be weighed while still moving; ideally at highway speed. A number of newer, portable WIM devices are currently on the market and are described in the Appendix E - Vendors And Product Sheets.

3.2.6 Variable Message Signs (VMS)

VMS, sometimes also referred to as Dynamic Message Signs (DMS), have been in production for nearly 30 years. A couple important considerations of a VMS are brightness and resistance to glare, especially when used in bright or sunny locations. Another important consideration is compliance with the National Transportation Communications for ITS Protocol (NTCIP) inter-operability standard. Only NTCIP-compliant systems can be purchased with federal ITS funds.

3.2.7 License Plate Recognition (LPR)

LPR has had mixed success in the commercial vehicle environment for various reasons, including:

- Nonstandard (i.e., unpredictable) placement of license plates on trailers.
- Muddy or otherwise dirty plates.
- Bent or damaged plates.

However, a number of vendors were identified, including one that alternatively scans container ISO (International Organization for Standardization) numbers or other identification numbers that are printed on the vehicle.

3.2.8 Electronic Cargo Seals (e-seals)

E-seals come in a wide variety of configurations. The simplest e-seals indicate whether a locking pin or tie cable has been removed during transit, possibly indicating that the container or trailer had been opened. More sophisticated sentry systems log the date, time, and latitude/longitude position of the vehicle each time the trailer or container is opened, and can even notify someone in real-time via a cellular phone link. Examples of these various e-seals are provided in the Appendix E - Vendors And Product Sheets.

.

III. RECOMMENDATIONS/IMPLEMENTATION PLAN

1. OVERVIEW

This implementation plan consists of developing and installing a CVO system using intelligent transportation system ITS technology at the Nogales international border POE.

The proposed system will be deployed as a means to enhance commercial vehicle movements across the international border while improving safety and enforcing trade and legal compliance. The project will place electronic transponder tags on commercial vehicles that cross the border and will install roadside tag readers at strategic locations along the corridor from Phoenix to the Nogales POE, along Interstates 10 and 19. The tags will permit electronic communication of crucial information about a truck and its cargo to both CBP and the ADOT. This will reduce the level of paper-based credentialing and manifesting transactions, and the delays associated with these transactions.

The proposed system will use a system architecture developed as part the FHWA's ongoing CVISN program, the FHWA's International Border Clearance (IBC) architecture, the CBP's Automated Manifest System (AMS), and ADOT's EPIC project. This proposed implementation plan is based on a corridor-level perspective that recognizes that an international border is functionally much more than a line between two countries. The work will be conducted in coordination with the FHWA, ADOT, the Arizona DPS – Highway Patrol, and the CBP. It will acknowledge other border-oriented ITS and roadway construction projects occurring within Arizona and Mexico. The deployment will use proven technology and will be interoperable with federal CVO programs at other border crossings. The first phase of this multi-phase project will allow expansion to accommodate larger trade areas and new technologies.

1.1 Proposed Project Implementation Objectives

The overall proposed project objectives of this proposed border crossing CVO system include the following:

Compliance Assurance: By automating a portion of the CBP's and the ADOT's inspection processes, a CVO system can reduce the negative impacts of safety and border inspections for safe and reputable carriers while better focusing personnel resources on noncompliant carriers.

Electronic Screening-Clearance via EDI: ITS will allow trucks to be electronically screened for safety and cargo clearance, so that compliant and legal operators may avoid unnecessary delays, and enforcement personnel may focus on carriers and drivers who may be noncompliant.

Future Growth: By developing a working system from available funding and technology, this project will provide the foundation for a more technologically advanced ITS/CVO border system that serves a greater number of commercial vehicles and a larger trade area.

1.2 Key ITS Enhancement Elements

The project will have three main elements that are discussed as follows:

Container System - This system will permit the CBP at the Nogales, Arizona border crossing to preview manifests for truck-borne containers from participating shippers traveling north and south across the border. The readers and tags will communicate using the ISO 10374 standards. The tags will contain information linked to CPB's Automated Manifest System, or AMS.

Power Unit Identification System - Transponders and Weigh-in-Motion (WIM) equipment will be combined to identify CVO power units (the tractor). Electronic tags on the power units will allow compliant trucks to bypass the weigh station, as well as permit the DPS to electronically review safety and driver information. The tags and readers will comply with the FHWA's standard for Dedicated Short Range Communications (DSRC).

Container/Power Unit Linkage - This element establishes an interface linking the ISO tags on the containers and the ASTM tags on the tractor power units that haul the containers. This interface, whether software or hardware, will allow CBP to access travel time information and the DPS to determine the contents of containers.

2. PROPOSED PROJECT GUIDELINES

Project development will need to meet a number of general guidelines. These guidelines ensure that the project will use technologies that have already been proven, will result in a system that is fully interoperable on a national and international level based on a corridor-level perspective, will foster and rely on cooperation and coordination with a number of jurisdictions, and will be designed for future expansion. These guidelines are discussed in greater detail in the following sections:

Proven Technology - The technology used for this CVO border system will be commercially available and with have been tested in other locations. This project is not designed to be a test of untried technologies.

Interoperability - The project will follow the IBC system architecture and be interoperable with other border crossing data systems. These include the field demonstration of the North American Trade Automation Prototype (NATAP) initiative being tested by the field operational tests. NATAP, which is a joint initiative among the United States, Canada, and Mexico, is standardizing data and document processing for trade agencies involved in border clearance.

This project shall support national-level commercial vehicle data interoperability by using the CVISN architecture being developed by the John Hopkins University/Applied Physics Lab. This architecture shall form a communication network for sharing crucial commercial vehicle information and will form the framework for the databases used in this effort. This project shall use the CVISN standards to ensure that the system complements the FHWA's efforts to develop a national ITS architecture and shall support the long-term success of national and international CVO operations.

Corridor-level Perspective - For this project, the border will be considered part of a corridor stretching from Phoenix to the Nogales POE, along Interstates 10 and 19. . This perspective is

important because it will permit a more flexible and functional approach to enhancing commercial vehicle movements on the transportation system. This corridor can be expanded as the border system grows.

Institutional Integration - This project will depend on cooperation and coordination among a number of jurisdictions. The eventual system design for the corridor will be the product of cooperation among agencies with jurisdiction in the border corridor, as well communication with end users of the system.

A number of governmental agencies have ongoing or planned projects that are oriented toward vehicle movements across the border. This project provides a timely opportunity to cooperate and integrate with these other programs. This will both enhance the success of this project and assist other agencies in their goals

Development of this project will provide a framework for growth beyond the Nogales border corridor. Commercial vehicles traveling from ports east and west of Nogales along the U.S.-Mexico border may be able to tie into a CVO border system. Eventual expansion and coordination with other states or federal regions would also be reasonable. Recognizing the longer-term potential inherent in this project, the system design and project recommendations will be oriented toward future expansion. Specifically, this project will be considered an initial phase that is focused on the deployment of a usable system in one corridor. This first step will guide the development of additional phases that expand the CVO system to other areas and to greater numbers of commercial vehicles.

2.1 International Border Clearance (IBC) Program

The proposed system will use a system architecture developed as part the FHWA's ongoing FHWA's International Border Clearance (IBC) architecture.

The vision of the IBC program is to provide "seamless, harmonized, and timely clearance of international commerce between and through trading countries resulting in safe and legal commercial operations. This vision is to be achieved through the harmonization of documentation, the standardization of data elements, and the acceptance of an international data syntax for the exchange of transportation and trade data." The IBC program was initiated under the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA). Although the program was initially intended to be a means of using ITS to enhance the efficiency of processing commercial vehicles at international border crossings and to improve the safety of those vehicles, it was later expanded to assist the U.S. Treasury Department in gathering and efficiently processing import/export data.

Under this program, ITS equipment has been implemented at seven border crossings – five with Canada and two with Mexico. This effort has been closely coordinated with various federal, state, and local agencies, shippers and carriers, and the FHWA, which has sponsored the implementation of local processing and network systems that provide connectivity to other governmental agencies. The IBC program coordinates the incorporation of modern advancements in Information Technology (IT) and vehicle identification systems to more efficiently and accurately monitor the vehicles, cargos, and drivers as they enter the United States. The program is continuing to expand, as interfaces with state commercial vehicle information systems are developed under the FHWA ITS/CVO program. This overall effort

results in faster and more accurate processing of shipments, while easing congestion and improving the environment.

The IBC program is primarily comprised of four components:

- Implementation of technology at various border crossing sites.
- Interfaces with existing and planned governmental processing systems.
- Partnerships with transportation, customs, and immigration entities in the United States, Mexico, and Canada.
- Interaction with private stakeholders involved with commercial border crossing activities.

During initial IBC program testing in Fiscal Year 97-98, ITS technology was deployed at several sites including Nogales. Subsequent testing that took place in Fiscal Year 2000-01 in Laredo, Texas and Detroit, Michigan, demonstrated a Freight and Trade Processing System (FTPS), which had a direct interface with the CBP. FTPS technology can enhance efficiency at border crossings by validating vehicle and driver safety status prior to crossing the border.

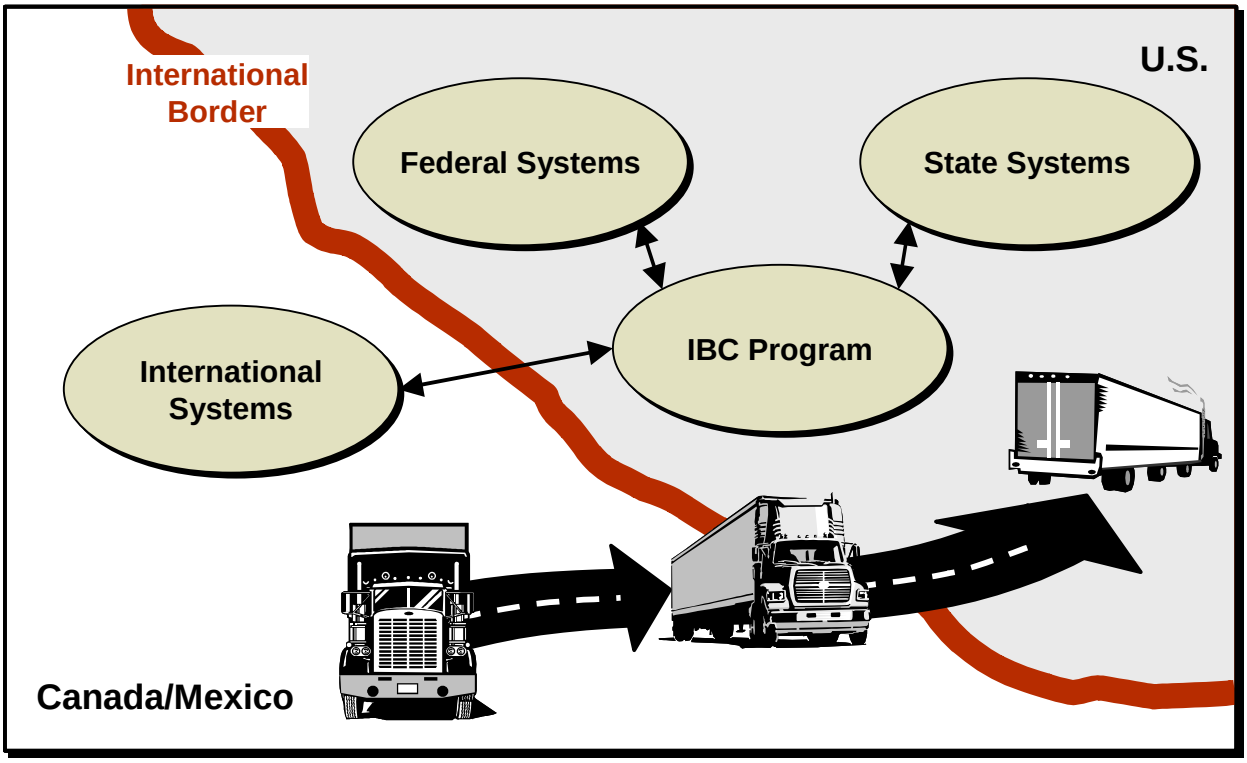


Figure 5 – IBC Conceptual Overview

There are 65 U.S. governmental departments and agencies that are directly or indirectly involved in monitoring, quantifying, or enforcing the regulations of international trade movement. The major ones of these include:

- Department of Transportation.
- Department of the Treasury.
- CBP.
- Immigration and Naturalization Service.
- FDA.
- USDA.
- FHWA.

The Office of Freight Management and Operations (within the FHWA) is managing the IBC program, including the installation and upgrading of ITS equipment at the border crossing sites and the integration with systems in the United States, Mexico, and Canada.

The law enforcement agencies of the individual states are responsible for the enforcement of truck weight and safety laws, although at selected border crossing such as the Nogales POE, they are assisted by FMCSA inspectors.

2.1.1 Concept Of Operations

Trading firms, often through shipping brokers, will electronically file shipment declarations to the CBP prior to the arrival of the shipment at the border. The declarations contain information for both the cargo and the carrier/vehicle/driver, following the protocol specified by the North American Trade Automation Prototype as a baseline interface to the International Trade Data System being developed by the U.S. Treasury. The declarations will be evaluated prior to the shipment arriving at the border; additionally, the Freight and Trade Processing System will allow state agencies to screen and evaluate each carrier, vehicle, and driver and report their findings back to the FTPS.

When the shipment arrives at the border crossing, a unique transponder code aboard the vehicle is read and forwarded to Washington, D.C., where the prescreening results are retrieved and returned to the CBP officials at the border crossing. At this point the vehicle, driver, and shipment can be automatically cleared to proceed or held for further inspection.

In its final form, the IBC system architecture, and the FTPS or equivalent system, will be able to:

- Permit connectivity with state and federal vehicle information systems for safety or credentials verification.
- Provide access by other organizations regarding the status of a particular shipment.
- Provide connectivity with state roadside inspection facilities.
- Accommodate a wide variety of information management scenarios.

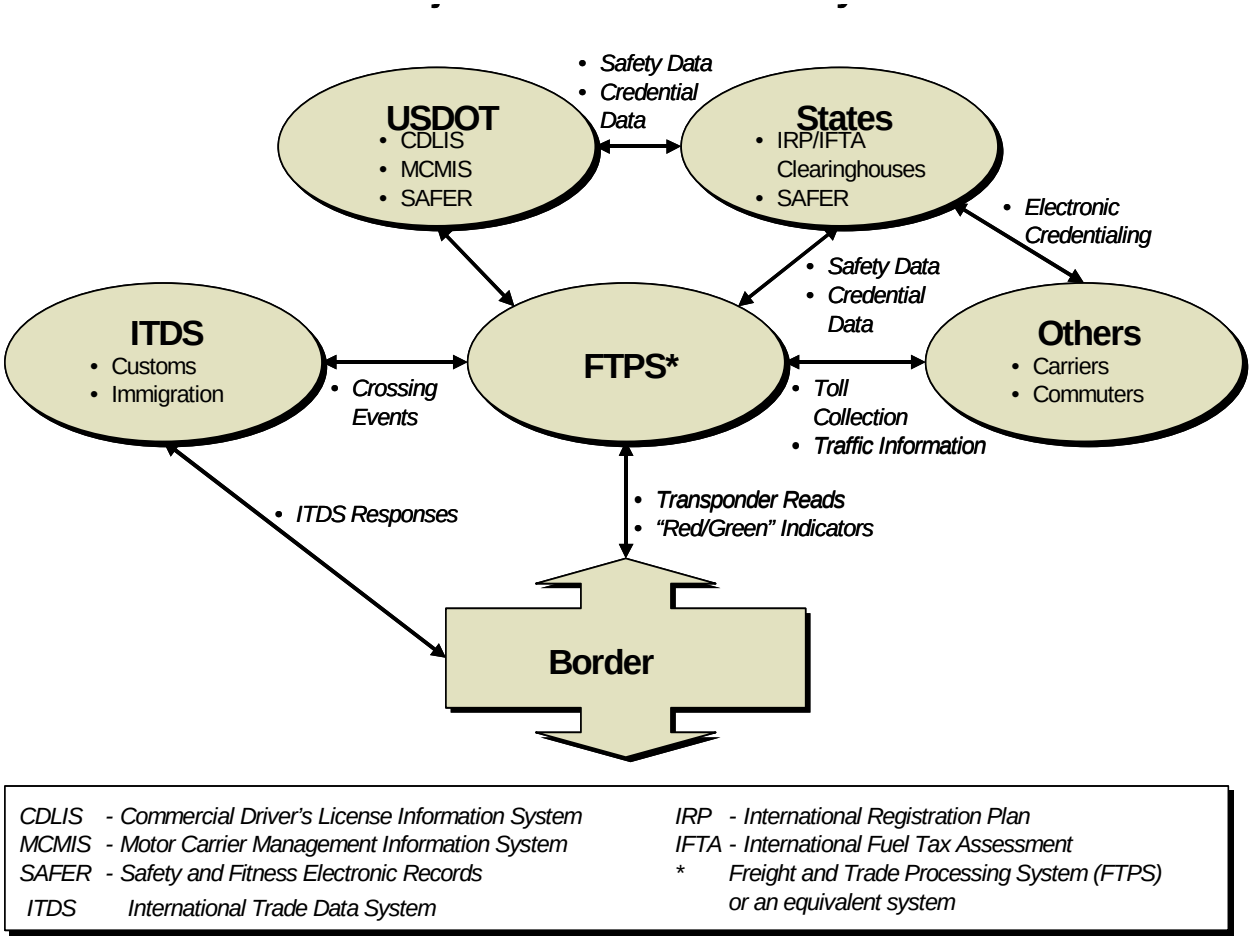


Figure 6 Projected IBC Interconnectivity

2.2 ADOT Nogales Port Of Entry Status

As Arizona's main commercial truck crossing, Nogales processes all international commercial traffic entering the state. According to the U.S. Department of State, 60% of all winter produce consumed in the United States and Canada passes through Nogales, Sonora, which makes Nogales the largest inland port for fruits and vegetables in the United States. Due to the nature of this traffic, most of the international truck shipments through Nogales occur during the winter months.

The Nogales POE, which is located at Mariposa, approximately three miles west of central Nogales, is equipped with one fixed weigh and inspection station, augmented by mobile inspection devices used by inspectors. This equipment includes wheel scales, roll-up mat scales, and a Special Response Interactive (SPRINT) port. Additional types of portable scales are used as necessary in the facility and by detail strike forces.

2.2.1 Key Attributes Of Nogales

The following are key attributes of the Nogales POE.

- U.S. and Mexican agencies are working together at Nogales to improve their relationships and work towards a common agenda, enhancing safety and facilitation of trade.

- Mexico has invited the ADOT MVD to set up a satellite office to pre-process Mexican trucks before they reach the U.S. border.

- U.S. CBP and ADOT work together to staff and process trucks at the "Superbooth," which has a goal of processing 60% of the trucks in queue.

- Arizona DPS has trained 80 Mexican motor carrier inspectors at over 10 sites since 1995; however, Mexico has not yet passed the laws that are necessary for enforcement, and delays in the full implementation of NAFTA have impeded interest in cross-border training.

- Arizona DPS has also trained inspectors for other agencies in Arizona; these other agencies conduct approximately one-third of Arizona's commercial truck inspections.

- Both random and discretionary inspections are carried out. Once a vehicle has been selected for inspection, an Inspection Selection System (ISS) identifies what specific inspection is to be conducted.

- The state of Arizona does not place a high emphasis on enforcement of federal commercial zone restrictions, and the extent of violations is not well known.

2.2.2 IBC At The Nogales POE

The implementation at Nogales included IBC along with Management Information System for Transportation (MIST™), variable message signs, closed-circuit television, and Weigh-in-Motion scales. Two additional slow-speed Weigh-in-Motion scales are installed on the approach to the U.S. CBP primary inspection site.

Expedited Processing At International Crossings (EPIC) Evaluation

The Field Operational Test of EPIC revealed a number of findings:

- By allowing electronic verification of trip permits, EPIC has the ability to significantly reduce – between 9 and 13 minutes – the amount of time a truck must spend in the border compound by eliminating the need for drivers to stop at the ADOT office. This saving does not apply to participating carriers registered in Arizona, who already do not have to stop in the ADOT office, although they could derive some benefit from receiving congestion information.

- Preclearance to use the Superbooth enabled vehicles to bypass the compound altogether, saving over 80% (25 minutes) of the normal travel time through the compound.

- ADOT estimates that EPIC preprocessing could save approximately two minutes for every trip report that did not require manual data entry.

- There are still some issues to be resolved:

  – Funding restrictions preclude fixed weigh stations at all ports; facilities lacking scales are often used to bypass inspections, although SPRINT ports can be used to circumvent this.

  – Additional capabilities of determining vehicle status – such as identification, systems, credentials, and operating condition – would be beneficial to facilitate faster processing and to enhance safety.

2.3 Border Clearance Program Lessons Learned

The following is a discussion of lessons learned regarding institutional, infrastructure, operations, technology, safety assurance, and border directional issues aspects of a border clearance program.

2.3.1 Institutional

Issues: Nontraditional relationships among border stakeholders has resulted in some uncertainty regarding effective methods for co-funding bi-national technology initiatives. For example, no method is in place for maintaining sensor systems like DSRC in a uniform manner in both nations.

Lessons Learned: As with many domestic ITS/CVO initiatives, institutional issues represent the most significant hurdle in deploying and using technology as a tool for improving processes at international borders.

Challenges: The local and international alliances formed in order to improve commercial vehicle movement at the border will continue to drive the level of success of IBC initiatives.

2.3.2 Infrastructure

Issues: At each of the border crossings investigated, planned and actual capital improvements of U.S. CBP compounds involved expansion of inspection areas, redesign of roadways to and from the border, and implementation of new technologies, yet plans for weigh and inspection facilities remain conspicuously absent in most locations.

Lessons Learned: CBP compound facility improvements play a major role in addressing the concern of excessive delay in processing through the border, but a combination of resource constraints and space limitations in many cases precludes the construction of fixed safety inspection facilities.

Challenges: Alternatives to fixed safety inspection facilities, including the application of ITS technologies, and the development of joint compounds in one of the countries, must continue to be explored to ensure that safe trucks entering the United States are not delayed.

2.3.3 Operations

Issues: Representatives at each site indicated expectations that the NAFTA would result in significant increases in traffic at international border crossings.

Lessons Learned: Little is known or understood regarding how cross-border goods movement business models will evolve once the full provisions of NAFTA go into effect, but the combination of increasing volume and diminishing levels of enforcement personnel is likely to result in continued delays.

Challenges: Further understanding regarding the future of such localized business phenomena, as drayage and storage yards on the southern border, must be developed if states are to effectively allocate resources along trade corridors.

2.3.4 Technology

Issues: At those POEs where IBC systems have been installed and tested, evaluation results have validated the technical feasibility of ITS to support federal, state and local trade and transportation processes.

Lessons Learned: Significant progress has been made in applying ITS international borders, but existing facility configurations limit the applicability of a uniform border system design/architecture.

Challenges: A continued focus on the refinement of technology, and the opportunities to demonstrate connectivity and interoperability with other federal and state systems will allow agencies to more effectively leverage IBC systems, and facilitate success at our international borders.

2.3.5 Safety Assurance

Issues: Development of an enhanced public safety policy can make significant strides in increasing the enforcement presence and apply ITS technology to aid inspection selection processes, while keeping in mind that targeted inspections may still be illegal in some states due to reasons of privacy. With the signing of Patriot Act, some states have adjusted their activity to accommodate security concerns and privacy issues.

Lessons Learned: The combination of more, better-trained inspectors and a strong focus on the development and employment of more efficient, effective inspection selection practices offers significant promise for ensuring the safety of non-U.S. trucks.

Challenges: Since one of the primary benefits of ITS is its usefulness in leveraging technology to focus enforcement, realizing its full value may require laws precluding selective inspections be amended or changed.

2.3.6 Directional Issues (Into and Out of the U.S. at the Nogales Border)

Issues: Differences in geography, topography, and road networks, combined with differences in cross-border goods-movement business models and crossing volumes at ports along the southern border, significantly influence the safety enforcement methods employed by state officials.

Lessons Learned: Differences between northern and southern border operations business models—primarily the result of drayage practices and vehicle inspection practices in Mexico and Canada—drive enforcement priorities and practices in the U.S. border states.

Challenges: ITS technologies have the potential to significantly improve operations in states where the construction of fixed weigh and inspection sites at each international border crossing is prohibitively expensive by allowing clearance of carriers that have a proven track record of safety and compliance.

2.4 Security Screening Approaches

The categories of vehicle security screening approaches that have been identified and evaluated by the Department of Homeland Security are:

- Whole-vehicle, nonphysically intrusive scanning technologies.
- Hand-held, moderately intrusive scanning instruments.
- Visual/physical, intrusive search methods.
- Use of trained dogs.

The following paragraphs describe each of these categories, with supporting examples of known applications for industry and government properties. Original Equipment Manufacturers (OEMs) were contacted for information on each technology, and for data to support the quantitative attributes cited in the analysis. For government agencies or industries that have allowed it, applications of specific technologies are cited.

It should be noted that none of the applications cited are entirely limited to one specific technology – each situation represents a combination of one or more technologies with human experience and judgment. For example, the CBP uses dogs, x-ray machines, wands, and scanners and the inspectors' judgment to determine if more intensive inspections are necessary after a random screening. The examples bear out that no single technology should be used as a sole screening tool and/or method.

2.4.1 Whole Vehicle Screening

Fixed x-ray vehicle inspection systems are available with a maximum hourly throughput of 20 vehicles and capable of penetrating solid steel more than 200mm thick. These installations can cost more than $10 million. Such equipment has been installed in inspection buildings for inbound and outbound vehicle traffic at Lok Ma Chau Control Point in Hong Kong. Costing about $113.8 million, the system consists of the following: components:

- X-ray generator (LINAC - Linear Accelerator).
- Detector array (converts the intensity of the X-ray received into electronic signals).
- Special Purpose Transport Mechanism (SPTM) (Flatbed).

- Control software.
- Image enhancement software.

X-ray vehicle inspection systems are safe and impose no hazard to properly trained operators or the occupants of the vehicles they screen. The passengers must exit the vehicle during screening to prevent their exposure. Training is necessary to ensure operator and public safety, to enable detection and identification of dangerous and prohibited items, and to ensure proper use of the four integrated applications listed above, including control and image enhancement software. This technology is available from several OEMs.

- **Time**: 10 minutes per vehicle.
- **Staff**: 2 minimum.
- **Intrusiveness**: No personal contact with vehicle.
- **Investment**: $10 million per installation.
- **Maintenance**: Minimal software administration, minimal calibration by OEM.
- **Expertise:** Requires specialized training estimated at two weeks and $1,600 each inspector.

Under-vehicle surveillance systems are available in mobile and static configurations that provide high-quality digital pictures of the undersides of vehicles. Such systems cost about $6,000 per installation. Vehicles can pass at speeds up to 25 km/hr, a high throughput in comparison with other methods. Any size vehicle can be driven over the CCTV capture system, which utilizes a touch screen interface to control zoom and storage functions. The system is typically used for border control, high security and military installations and prisons. Special training is required to prepare operators to identify vehicle undercarriage configurations on a CCTV display, identify recently modified components and access panels, and operate the system features, such as pan, zoom, and archiving of digital images.

The capability of this technology is limited to screening the undercarriage of the vehicle and must be combined with a means of checking the internal compartments of a vehicle. This technology is available through several OEMs.

- **Time:** 1 minute per vehicle.
- **Staff**: 2 minimum.
- **Intrusiveness**: No personal contact with vehicle.
- **Investment**: $6,000 per installation.
- **Maintenance**: Minimal software administration, minimal calibration by OEM.
- **Expertise**: Requires specialized training estimated at one week and $400 each inspector.

2.4.2 Portable Screening

Mobile multi-energy x-ray security inspection systems are movable devices that penetrate solid steel up to 25 mm thick, and can cost more than $150,000. Implemented at the Texas-Mexican border in McAllen-Hidalgo, such instruments are used to screen packages and luggage up to a maximum weight of 100 pounds. These instruments can be powered through the civil power system or an onboard power supply for two to hour hours. Smaller x-ray scanners for baggage and package screening can cost less than $100,000 for the equipment. In either case, baggage or packages must be removed from the subject vehicle for screening. Explosives are not easily

detected by x-ray because many explosive compositions, frequently encountered, are not organic and will not show up (e.g., black powder, sodium chlorate, and flash powder mixtures). Dual-energy technology that helps distinguish between organic and inorganic materials is available as an add-on feature, at a cost of about $10,000. A special staging area is required for any x-ray technology utilized for package or luggage screening, also requiring additional time.

This technology is applicable to vehicle contents, but not to the overall screening of vehicles themselves. Locally effective statutes may prohibit the random search of passenger packages or luggage without probable cause.

Portable x-ray inspection systems are safe and provide no hazard to the operator with proper training. The passengers are not exposed because the packages/luggage is removed from the vehicle for screening. Training for operators of this type of equipment is necessary to ensure operator and public safety. Special training is required to ensure operators understand and observe relevant legislation and procedural requirements, as well as x-ray safety and material identification techniques. This technology is available through a number of OEMs.

- **Time**: 5 minutes per vehicle.
- **Staff**: 1 minimum.
- **Intrusiveness**: Personal contact with luggage/packages, vehicle needs to be unloaded.
- **Investment**: $150,000 per installation.
- **Maintenance**: Minimal software administration, minimal calibration by OEM.
- **Expertise**: Requires specialized training estimated at two weeks and $1,600 for the inspector.

Portable trace detectors are combined vapor and particle detectors. They cost between $25,000 and $40,000 per unit, and identify a limited range of explosives and chemicals by their particulate or gaseous elements respectively. They are hand-held weighing about six pounds with a warm up time of 10 minutes, analysis time of less than 30 seconds and a 90-minute battery life. The vapor detection capability identifies volatile explosive compounds with a high vapor pressure (i.e., nitroglycerin) but will miss plastic explosives such as PETN or black powder. Vapor detectors are capable of providing results in a few seconds. The particle detection capability analyzes trace amounts of chemical compounds found in some explosives. Some trace detectors integrate chemical weapons detection as well. They detect nerve and blister agents, such as Tabun, Sarin, Soman, Cyclosarin, Agent VX and Vx, Nitrogen Mustard 3, and others.

Particle detectors work under the premise that a person handling explosives will become contaminated and the exterior of the vehicle would have trace amounts. These devices have been used with minimal success in detecting explosive development because they are best at identifying rarely-used explosive compounds. In addition, such detectors will only deliver their intended reliability if the operator has access to vehicles' internal compartments, thereby increasing the intrusiveness rating.

Special training requirements include equipment calibration, daily maintenance and cleaning procedures, and identification of false positive readings. As fairly new technology, these devices are available from a few technology developers/OEMs.

- **Time:** 1 minute per vehicle.
- **Staff**: 1 minimum.
- **Intrusiveness**: No personal contact with vehicle.
- **Investment**: $40,000 per installation.
- **Maintenance**: Minimal calibration by OEM, 5 minutes of maintenance and battery charge every 90 minutes.
- **Expertise**: Requires training estimated at one day and provided by the OEM.

Chemical reagent detection kits are aerosol-based field test devices that cost about $200 per unit. The kits normally include 50 test papers, verification papers and three cans of spray. The collection process takes only a few minutes, and the test is immediate. The detection capability is limited to Group A explosives (TNT, TNB, etc.), Group B explosives (Semtex H, RDX, etc.) and compounds that may contain nitrates used in improvised explosives. They require a lot of explosive residue to provide a positive detection. Most reagents are toxic and require special training and handling, especially in a public area. Therefore, a staging area is required for the test. The time for moving a mobile test bench throughout the vehicle screening area and/or running samples back to a staging area can require up to 10 minutes per screening.

Although not required, access to the internal compartments of the vehicles would increase reliability in detection thereby increasing the intrusiveness rating. The suspect area is wiped with an adhesive collection paper and the spray is consecutively applied with each of three different sprays until an immediate color reaction indicates a positive identification. This methodology is fast and efficient, providing immediate test results.

Special training for taking samples from the vehicles enables personnel to understand and relevant legislation and procedural requirements, as well as to recognize a positive test indication. This technology is readily available and can be obtained from several OEMs.

- **Time**: 5 minutes per vehicle.
- **Staff**: 1 minimum.
- **Intrusiveness**: Requires wiping with a sample gathering cloth of vehicle.
- **Investment**: No up front cost.
- **Maintenance**: Minimal calibration by OEM, 5 minutes of maintenance and battery charge every 90 minutes.
- **Expertise:** Requires training estimated at one day and provided by the OEM.

2.4.3 Visual Inspection

Inspection mirrors, in their most elaborate forms, cost up to $1,000. They provide a view of the underside of vehicles with lights and dual periscopic mirrors mounted on a dolly with wheel casters. This allows the operator to remain standing during a detailed inspection of the undercarriage. The power source for lighting is civil 110 volts and requires proximity to an electrical outlet. Simple inspection mirrors allow staff to look under a vehicle during a walk around, and cost less than $100. These devices are a mirror mounted on a telescoping wand and are augmented with the use of a flashlight. The lack of lighting causes recognition of details to be cumbersome. Special training for the operation of both types of mirrors requires requisite knowledge of various vehicle undercarriage configurations and how to identify recently modified components and access panels.

This approach is limited to screening the undercarriage and outside of the vehicle and must be combined with an approach to check the internal compartments of a vehicle. Visual inspection by staff provides a psychological deterrent with a simple walk around of a vehicle. At the Texas-Mexico border, CBP personnel perform "walk-around" driver and vehicle inspections. The inspectors look for suspicious material as well as the unusual behavior of occupants. Special training requirements include: how to observe and monitor people, how to report information and observations in an appropriate manner, and how to relate to people from a range of social, cultural, and ethnic backgrounds and varying physical and mental abilities. The "walk-around" requires experienced staff with the appropriate training, such as previous law enforcement and/or customs inspection backgrounds.

- **Time:** 2 minutes per vehicle.
- **Staff**: 1 minimum.
- **Intrusiveness**: Climbing around vehicle to gain advantage points not provided by mirrors may require contact with the vehicle.
- **Investment**: Less than $1,000 per installation.
- **Maintenance**: None.
- **Expertise:** In addition to law enforcement and/or customs experience, this approach requires specialized training estimated at three weeks and $2,500 for each inspector.

2.4.4 Dogs

Screening dogs (K-9s) are highly-trained canines that have undergone intensive training and behavioral programs costing about $20 thousand per animal. They detect firearms, explosives, and explosive compounds, including: commercial dynamite, ammonium nitrate, C-4 or Flex-X, TNT or military dynamite, primer cord and slurries or water gel.

Although not required, access by screening dogs to vehicles' internal compartments would increase reliability in detection, but increase the intrusiveness of this approach.

A K-9 requires a break every 30 to 45 minutes of work. K-9s requires kennel facilities, trained caregivers, food and medicine, and special transportation to and from inspection sites. The overall maintenance costs for a K-9 can be $50,000 per year. Skilled staff to guide the explosive-sensitive K-9 and interpret its behavior are required, with a staff training cost between $1500 and $6000 per person. Governments and industries utilize the K-9 as a cost effective and efficient chemical detector as well as a good psychological deterrent.

- **Time**: 1 minute per vehicle.
- **Staff**: 1 minimum per dog (inspector only).
- **Intrusiveness**: No personal contact with vehicle.
- **Investment**: $20,000 per animal.
- **Maintenance**: Requires a trained caregiver, a kennel, food and regular veterinary care equivalent to one staff member per dog. (Care of multiple dogs experience economics of scale, reducing individual maintenance costs.) Ownership and maintenance of K-9s can be contracted out, the primary strategy in industry.
- **Expertise**: Requires specialized training estimated at three weeks and up to $6,000 per inspector.

2.4.5 Technology Evaluation

Table 6 compares surveyed technologies with respect to the defined criteria. The time requirements are derived from the technical specifications provided by the OEMs, including the staging of vehicles, materiel, and staff. The staffing requirements are estimates based on the survey of actual installations. The intrusiveness rating of High is for screening activities that disturb the vehicles through unloading or touching (i.e., sample wipe), and Low when the occupants and vehicle are not disturbed at all. The full time equivalent (FTE) of $50,000 was used to estimate a cost of $0.40 per staff minute to operate the technology.

Table 6 - Comparison of Vehicle Screening Technologies

Technology	Time to Screen 1 Vehicle (minutes)	Staffing to Support the Technology	Intrusive-ness	Capital Cost (One Location)	Operating Cost (One Screening @ $.40/staff minute)
Whole Vehicle					
X-ray	10	2 FTE=$100,000	Low	$10,000,000	$8.00
Under vehicle CCTV	1	2 FTE=$100,000	Low	$6,000	$0.80
Hand Held					
Portable X-ray	5	1 FTE=$50,000	High	$150,000	$2.00
Vapor/Particle Detectors	1	1 FTE=$50,000	Low	$40,000	$0.40
Chemical Reagents (e.g., Expray)	5	1 FTE=$50,000	High	N/A $4/test	$6.00
Visual					
Inspection Mirrors	2	1 FTE=$50,000	Medium	$1,000	$0.80
Dogs					
K-9	1	2 FTE=$100,000	Low	$26,000	$0.80

3. CVISN ELECTRONIC BORDER SCREENING EDI IMPLEMENTATION GUIDELINES

This section is consistent with the guide that was prepared by The Johns Hopkins University Applied Physics Laboratory (JHU/APL), under contract to the US Department of Transportation (DOT), Federal Motor Carrier Safety Administration (FMCSA). The purpose of this section is to outline in general terms the Electronic Data Interface (EDI) transaction data sets that must also coincide with any advanced technology deployments at the border regarding CVISN. These EDI data sets relate to the information exchanged between government agencies to verify the regulatory compliance of motor carriers that travel across the border and operate in Arizona.

EDI transactions provide standard, predefined messages among stakeholders to communicate CVO-related information and allow computers to process information such as safety data and electronic screening enrollments. EDI transactions support data interfaces across various jurisdictions and between public (e.g., state motor vehicle administration) and private (e.g., carrier) offices.

The purpose of this section is to provide information one or more connections using Accredited Standards Committee (ASC) X12 EDI Transaction Set (TS) 286 for electronic screening enrollment transactions.

3.1 Applicability

This section provides specific coding information for implementing TS 286 for electronic screening-related enrollment transactions that take place between an applicant and an issuing jurisdiction. The primary benefactor of information contained in this section is an EDI programmer tasked with implementing the 286 for such transactions, but we feel it important to have this information contained in this report for consistency.

The transaction set syntax followed in this section is that set by the American National Standards (ANSI) Accredited Standards Committee X12. An international EDI standard, the UN/EDIFACT standard is not presently in wide use in U.S. commercial vehicle businesses.

3.2 Associated Transaction Sets

The following transaction sets (transaction sets are pre-defined data packets of information that are communicated between systems) are associated with the TS 286 in an electronic screening enrollment processing model.

- TS 285 (Commercial Vehicle Safety and Credentials Information Exchange): Provide standard, pre-defined messages among stakeholders to communicate CVO-related information and to allow computers to process safety and credential data.
- TS 997 (Functional Acknowledgment): Acknowledge receipt of message. Communicate syntax problems in received message.

3.3 Responsible Organizations

A partnership of organizations will be responsible for the development and maintenance of information exchange and for supporting carrier and state implementation of commercial vehicle transactions. These organizations and their roles are:

Federal Motor Carrier Safety Administration – Direct and fund the development of ANSI ASC X12 format transaction sets and associated documentation to support CVO under the ITS/CVISN architecture, and to encourage their use in CVO nationwide.

American National Standards Institute Accredited Standard Committee X12 –Develop, maintain, interpret, publish, and promote the proper use of American national standards and international standards for electronic data interchange.

The Johns Hopkins University Applied Physics Laboratory - Develop and maintain transaction sets and prepare or coordinate the preparation of related documentation for the electronic data interchange of all safety-related information and credentials associated with

commercial vehicle operations under a contract with FMCSA for development of an architecture for CVISN and the Safety and Fitness Electronic Records (SAFER) system.

Intelligent Decision Technologies, Ltd. - (Southwest One-Stop, Maryland and Minnesota CVISN development) **-** Develop software to enable commercial vehicle operators to obtain all required tax and regulatory credentials from a single source.

3.4 Commercial Vehicle Credentials Transaction Set (TS 286)

The Commercial Vehicle Credentials Transaction Set (TS 286) allows the electronic application, granting, and authorized exchange of credentials-related information required for the safe and legal operation of commercial vehicles. It can be used to exchange credential data among carriers, state jurisdictions and other authoritative centers, roadside check sites, and authorized industry representatives. TS 286 supports the information exchanged for several credential types, and state variations of different forms for each credential type, in a common transaction set. A one-stop process, where an applicant can electronically apply for all tax and regulatory credentials from a single location, is the envisioned EDI application

The data flows associated with commercial vehicle electronic screening enrollment are summarized in **Error! Reference source not found.** 8 as part of the CVISN architecture and provide to a users for a high-level perspective on the major interfaces between carriers and state agencies (jurisdictions) for the electronic screening enrollment process.

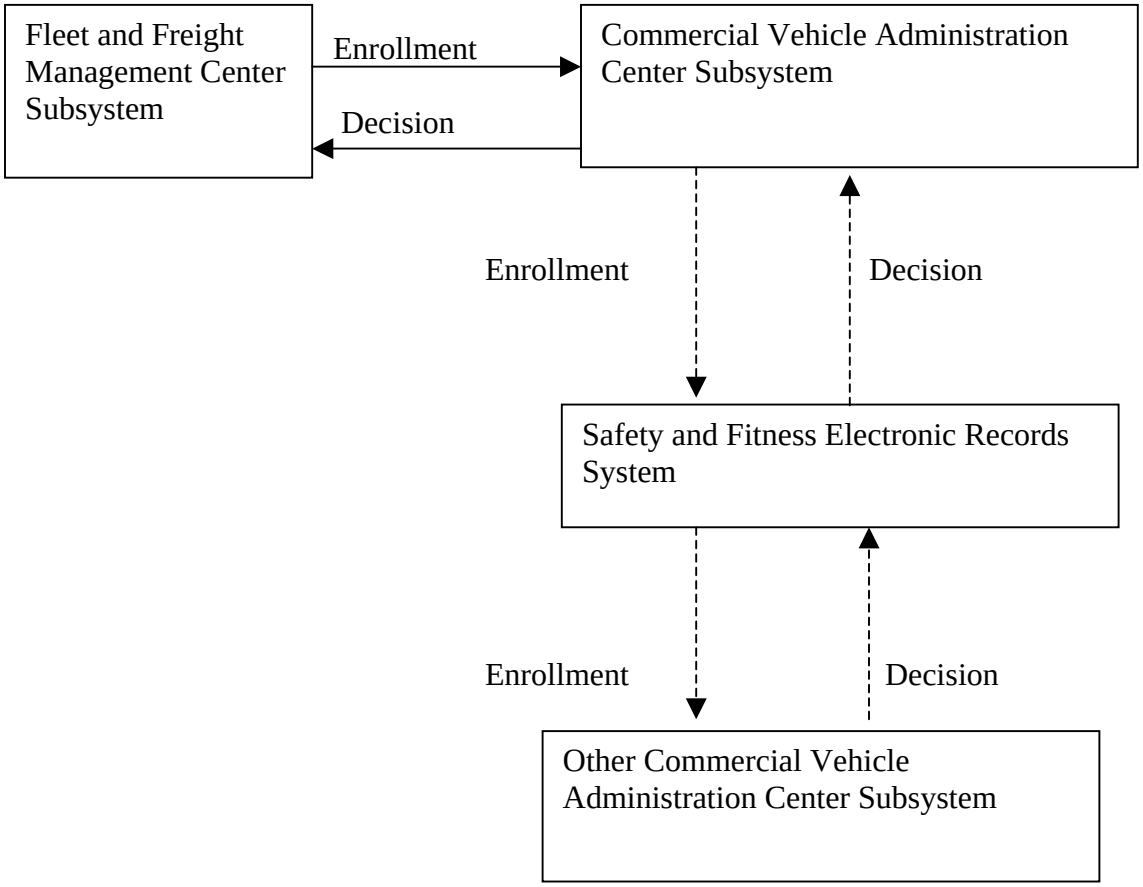


Figure 7: CVISN Architecture Flow Diagram for Commercial Vehicle Electronic Screening Enrollment

All interfaces shown are EDI transmissions of electronic screening-related information and include a standard functional acknowledgment (TS 997). All solid lines indicate TS 286; dotted lines are TS 285.

TS 286 is one of several EDI transaction sets developed as part of the CVISN project. CVISN is a U.S. DOT/FMCSA project that is generally concerned with applying technology to improve the safety and efficiency of North American commercial vehicle operations. The CVISN design has identified EDI as a key to communicating data related to commercial vehicles and their operations in an efficient, open, and accessible manner. This includes the electronic application for credentials, automatic processing of the electronic application, and electronic return of credentials information.

The CVISN architecture will enable authorized stakeholders to exchange electronic information via open standards and using a variety of transmission options. Individual jurisdictions, or their designated agent, will be the authoritative source of information on credentials that they issue. The U.S. DOT/FMCSA is also encouraging the development of credentialing and permitting under regional agreements, and the implementation of clearinghouses to support that concept.

3.5 Electronic Border Screening Program

Screening, applied to commercial vehicles, is a selection mechanism to make efficient use of limited fixed weigh station and inspection resources. Electronic border 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 border screening results in improved station traffic flow, focused vehicle inspections, increased compliance and ultimately achieves the goals of increased safety and reduced operating costs. Electronic border screening is a voluntary program that will allow vehicles with acceptable safety and inspection histories, and whose credentials are in order, to pass roadside sites without being stopped. Applicants select the jurisdiction(s) in which they wish to enroll and identify the vehicles to be operated in those jurisdictions. Jurisdiction electronic screening policies are outside the scope of this document.

The following provides implementation conventions for using the 286 to exchange data for:

- Carrier-to state transactions
  - Carrier initial enrollment
  - Carrier supplemental enrollment
  - Vehicle enrollment

- State-to-carrier transactions
  - Enrollment state rejection
  - Enrollment response

A fleet and freight management center or service provider will use TS 286 to enroll in an electronic screening program with the appropriate commercial vehicle administration. The commercial vehicle administration of the enrollment state will respond to the electronic screening (or disapprove, request re-transmittal/clarification) via EDI to the fleet and freight management center. States will exchange information on electronic screening via SAFER

provided information. A commercial vehicle administration will supply electronic screening information and a copy of the electronic screening information to authorized requesters.

3.5.1 Submit Electronic Screening Enrollment

An applicant initiates the process by requesting enrollment in one or more electronic screening programs. Typically, initiated by the fleet and freight Management center for carrier requests.

3.5.2 Respond to Electronic Screening Enrollment

Upon receiving a valid initial enrollment application, the enrollment state forwards the information to the SAFER system for distribution to the jurisdictions specified by the applicant. Each jurisdiction processes the data and either approves or disapproves the carrier's participation. SAFER receives each jurisdiction's decision and distributes the decision to the enrollment state. The enrollment state then:

- Optionally notifies the applicant of each jurisdiction's approval or disapproval.
- Requests a retransmittal or clarification of the information in the enrollment application.

If the information submitted was not valid, that is, there is no existing data for the carrier or the vehicle(s), or there is some other semantic problem, the enrollment state may send a rejection to the applicant and not forward any data.

3.5.3 Vehicle Enrollment

After carrier enrollment into a program, the applicant specifies each vehicle, and its jurisdictions, to be enrolled. The enrollment may be denied if a vehicle is not currently registered or SAFER has not received the carrier enrollment information.

3.5.4 Security

Where applicable, trading partners are responsible for following Federal Information Processing Standards (FIPS) and other statutes relating to computer security and privacy, including the Privacy Act of 1974. The following documents provide guidance in these areas:

- National Institute of Standards & Technology (NIST) FIPS (112) for passwords.
- NIST Special Publication 800-9, "Good Security Practices for Electronic Commerce, Including Electronic Data Interchange."

3.5.5 Acknowledgment Procedures

Received messages, except for the 997 transaction set, are uniformly acknowledged with a 997 (Functional Acknowledgment) transaction set. The location and nature of syntax errors in a received message are communicated with a 997. Syntactic correctness means compliance with

the X12 standard specified in this document. Possible 997 codes indicating accept or reject condition based on the syntax editing of the transaction set:

Code	Description
A	Accepted
E	Accepted But Errors Were Noted
R	Rejected

Messages received that are not in compliance with the appropriate implementation guide, e.g., with elements or segments designated as "Not Used" or unapproved codes, shall be acknowledged, if no syntax errors are detected, with a 286. Problems with the meaning and completeness (semantic content) of the received message are communicated by returning a 286 with an appropriate comment. Legal considerations for this implementation include:

Recordkeeping - Consider the legal issues when developing policies and procedures for the recording of EDI data.

Authentication - Verify the authenticity of the sender and receiver, as well as the content of the messages.

Trading Partner Agreements - Address the importance of trading partner agreements. Identify other related selected issues that should be considered when drafting an agreement. Trading partners are bound by the terms and conditions in this agreement and its included regulations. A model trading partner agreement has been developed by the American Bar Association (ABA) and addresses the major issues when using EDI. This model agreement may be customized to meet specific needs of trading partners.

Third Party Agreements - Identify any issues that users and networks should consider when negotiating EDI contracts.

Laws, Rules, and Regulations - Consider existing laws, rules, and regulations that should be consulted during implementation.

4. PROJECT IMPLEMENTATION

The major work tasks to be completed are to design, install, and evaluate the border crossing system. The tasks and deliverables involved in this process include the following:

Task 1: Exploration of other border crossing clearance systems (technical memo)
Task 2: Evaluation of existing technology (technical memo).
Task 3: Development of a concept of operation (design plan and acceptance plan).
Task 4: Institutional coordination (technical memo).
Task 5: System design documentation (technical memo).
Task 6: Deployment of an ITS/CVO infrastructure in the border corridor (working system and user documentation).
Task 7: Evaluation, recommendations, and documentation of the project (draft and final report).

4.1 Tasks

These tasks are discussed in more detail as follows.

4.1.1 Exploration of Other Border Systems

Because this proposed project is to be interoperable, it will be necessary to examine, mainly through document review and telephone interviews, other CVO border crossing sites and associated data systems. Principal among these systems is the FHWA's ongoing field operational tests in Buffalo, New York, Detroit, Michigan, Otay Mesa, California, Sweet Grass, Montana, and several sites in Texas. The success and problems with these systems will be examined, and this information will be used to guide the development of the CVO border crossing system. This effort will ensure that the proposed system will use proven technology and will be compatible with other systems in the country.

4.1.2 Evaluation of Existing Technology

Because the project is to be a functional deployment of a CVO system, the technology used will need to be reliable and tested. This will require the evaluation of existing technology. Ideally the hardware, such as readers and transponders, will be commercially available. The software and system architecture selected will be guided by the CVISN architecture standards being developed by John Hopkins University, Applied Physics Laboratory, the field demonstration of NATAP, the IBC system architecture, and experience acquired during the EPIC project.

4.1.3 Concept of Operation

The main purpose of this task will be to determine what type of electronic clearance and credentialing system should be developed. It will necessitate the development of an operational plan based on the previous tasks. The resulting document will present the conceptual design of the system and discuss objectives of the system.

4.1.4 Institutional Coordination

The success of this project will require contact with a number of agencies and private firms involved in international trade and work with staff from these agencies to ensure that the system provides the capabilities needed by various end-users. As part of this task, the financial participation by other agencies must be sought.

In addition, subsequent work will require the cooperation with the following institutions:

- FHWA
- Participating customs brokers/shipping companies
- Mexican government (federal and Sonoran)
- Mexican trucking associations
- Arizona trucking association

To develop an effective system, collaboration will be needed with the following agencies with responsibility in the border corridor:

- Customs brokers/shipping companies
- Mexican customs services
- ADOT – DOT and DMV
- U.S. General Services Administration
- U.S. Immigration and Naturalization Service
- U.S. Department of Agriculture
- Arizona Trucking Association
- Mexican Trucking Association
- Private trucking firms
- Border cities
- Customs brokers

4.1.5 Systems Design Document

One of the primary goals of this project will be to develop a functioning and reliable ITS-based CVO system. The successful deployment of this technology will require evaluation of the software, hardware, and communication requirements and then procure the equipment. Because of the need for interoperability, software used in the system is expected to guided by CVISN, the IBC system architecture, and the CBP Automated Manifest System (AMS). The determination of the hardware used will guided by availability from commercial vendors, results from other border crossing systems, and cost. Communication requirements will relate to the characteristics of the hardware and software, as well as to the physical location of the hardware. This element will require that the contractor create a specific plan for the hardware and software used for the systems. This design will be used as a "blueprint" for the actual infrastructure installation completed in the next task.

Concurrent with the design plan, an acceptance test plan must be created. This plan will discuss the acceptable functionality of both the hardware and software in the final system. ADOT will use this plan to develop a document used to accept the final system.

Several issues will need to be resolved in this task. Because both the DPS and CBP will be significantly involved with the infrastructure and systems used with this project, the transponder location and design will need to be compatible with these agencies' missions. DPS regulates and enforces vehicle licensing, safety, and weight. Electronic tags that are read at the weigh station(s) will need to refer to vehicle characteristics. This will require a transponder tag on the power unit (the tractor) that holds and communicates information about that vehicle or has an ID number that refers to a vehicle information database. The actual software and information format on the tag will be determined by CVISN standards. The communication between the reader and the vehicle transponder will match the FHWA's current DSRC standard.

The CBP's interest in commercial vehicle movement primarily focuses on commodity movements. Therefore, CBP mainly requires information related to the cargo on the commercial vehicle. Its Automated Equipment Identifier (AEI) program uses tags on the container, as opposed to the power unit. For security reasons these tags can only contain a container ID number. The ID will then be used by a CBP agent to access a CBP database containing cargo documentation. The format of the container ID number and the associated database will most

likely be guided by the successes at NATAP. The standards for the communication interface between the container and the readers at the port and the border station will use the ISO 10374. This has been an international standard since 1991, is widely used by shipping companies, and many containers are equipped with ISO 10374 tags.

Because the infrastructure installations will start out with different communication interfaces, one important aspect of this element will be to link the power unit tags (under ASTM #6 or #7) and the container tags (ISO 10374). For this project, a simple database link between the ID number on each tag may be reasonable. This linkage will provide a foundation for enforcement staff to share information. Such information sharing will be valuable to both agencies while facilitating vehicle movements. A link, for example, would permit an enforcement officer to determine the contents of a container being carried by a truck. Such information would be practically valuable in situations involving hazardous cargoes. In turn, information from enforcement managed weigh-station facilities would permit staff to monitor travel times and the route of cargo traveling between the port and the border stations. Such information would assist in enforcement actions. Other useful information exchanges that enhance the viability of the system will be identified.

Readers at the port's out-gates would record the departure of the container and activate an en route message. At this point, the ISO 10374 tags on the containers might be associated, via a software patch, with an ASTM tag on the truck hauling the container. The truck tag would contain safety, licensing, and other information following CVISN standards. As this vehicle approaches other weigh stations, an ASTM reader would register the tag and record this information. This information would be available for enforcement for monitoring the progress of the in-bond cargo. Shortly before the Nogales border station, readers would confirm the arrival of the truck (one ASTM #6 reader) and the container (one ISO 10374 reader). These two readers would be used to confirm that the correct truck was hauling the correct container. If they matched, the customs inspector could automatically export the container. The inspector could also decide to inspect the container, and the truck would be pulled over.

The proposed system would also address southbound movements of these vehicles. This aspect of the project would include a southbound ASTM reader, combined with mainline Weigh-in-Motion. These facilities would permit enforcement to allow vehicles to bypass the weigh station without the need to stop.

4.1.6 Installation of ITS Infrastructure

The contractor will procure and install the software, hardware, and communication links guided by the systems design plan. The contractor will be expected to purchase enough readers and transponder tags to initiate the system. The contractor will work with other agencies and attempt to obtain support from these agencies for purchasing further readers and tags.

The contractor will ensure correct installation and then debug and turn on the system. The contractor will provide sufficient support until the system has been accepted. Acceptance will occur after three months of full and consistent operation and after the system has passed an acceptance checklist created from the acceptance test plan developed in task 5. The contractor will also be responsible for training CBP personnel and staff from other involved agencies in the use of the system. The contractor will develop user manuals and whatever other support materials are necessary for system training and maintenance.

4.1.7 Evaluation, Recommendations, and Documentation

To measure the benefits provided by the CVO border crossing project, both quantitative and qualitative aspects of the system will need to be evaluated. The development of an evaluation process can be guided by the formal process developed by the FHWA for the field operational tests at other border sites, as well as by FHWA's technical assistance programs. It may be reasonable to survey users of the system to gauge the satisfaction and effectiveness of the system. The contractor will, as required,

- Conduct briefings on the system design, work plan, schedule, and development/ implementation issues.

- Participate in various evaluation, planning, and review activities.

Once the evaluation has been completed, a set of recommendations shall be developed. These recommendations are expected to suggest how to effectively expand this initial deployment.

4.1.8 Future Phases

The initial phase developed in the tasks above will serve as starting point for future phases. These later phases, while not funded, would expand the CVO systems and provide greater benefits to a wider range of commercial vehicle operators.

A second phase would stress technological improvements and facilitate CVO operations in both directions across the border. Elements that would be completed as part of this phase would include participation by Mexican customs with hardware on the Mexican side of the border continue to explore the findings from the other field operational tests and the NATAP implementation upgrade to new DSRC standards add ITS/CVO facilities at other weigh stations, corridor adopt upcoming technology to improve system efficiency and perhaps electronically link container tags and power unit tags on each vehicle.

A third phase would focus on expanding the CVO system to other areas. Elements completed as part of this phase would fully integrate the standardized data and document processes developed by NATAP include more and different types of commercial vehicles expand the system network to include the entire Interstate 15, Interstate 5 and Interstate 40 corridors.

4.2 Project Products

4.2.1 CVO Border System

The main deliverable to ADOT will be a fully functioning CVO border crossing system that will provide electronic arrival information for containers traveling across the border. A container-based system will be linked to a second system that contains information on the vehicle and driver. This system will be designed so it may be integrated with other border crossing initiatives, will be interoperable with other national CVO border, and will be oriented toward future expansion.

4.2.2 Documents

As part of the development of this project, various technical memoranda and reports will be prepared. The state, at its option, may copy, revise, and reprint any or all documents. The state, at their option, may reduce the total number of any or all documentation required under this contract. Copies of all document produced under this contract will be provided to the FHWA.

4.3 Project Management

4.3.1 Project Technical Advisory Committee

ADOT will establish a project technical advisory committee. The committee will consist of appropriate personnel from:

- FHWA
- ADOT
- Arizona Department of Public Safety
- Bureau of Customs and Border Protection
- U.S. Department of Agriculture
- Department of Homeland Security
- Participating customs brokers

Personnel from other agencies will be added as needed.

4.3.2 Project Schedule

Upon receipt of notice to proceed, a project schedule will be prepared and submitted to the project manager for review and approval. The schedule will call for completion in 18 months. The schedule will identify the duration and sequence of the project work tasks.

The project schedule will be used to coordinate project activities. It will be monitored to ensure that work tasks are started and completed on time. If necessary the initial project schedule can be modified to reflect variables such as time for review of CVO design documents by the involved agencies and end users, any equipment ordering backlog, and other situations beyond the Contractor’s control.

4.3.3 Monthly Progress Reports

Monthly progress reports will be prepared by the contractor and delivered to ADOT. These reports will include a narrative of the major activities performed during the month.

Work sheets showing hours expended by work tasks, original budgeted hours by work task, and updated estimates of hours needed to complete each work task will be attached to the narrative. Total staff hours and budget utilized to date will be compared to initial projections to provide an accurate reflection of the current status of the project.

4.3.4 Outreach Project Schedule

The ADOT will be responsible for outreach designed to stimulate interest and increase understanding of this project.

APPENDIX A - PROJECT BENCHMARKS AND EXPECTED DATES OF COMPLETION

Task Number	Task	Description	Percent of Project
1.0	Work Plan	Develop a final project plan and schedule	5%
2.0	Literature Review	Collect and assess information on ITS technology and the State's CVISN planning and implementation documents	15%
2.1		Research and collect literature, create bibliographies, including summaries of findings, lessons learned significant institutional and operational issues.	
2.2		TAC review and comment	
2.3		Revise and submit final technical memorandum	
3.0	Survey/Interview Stakeholders	Interview key stakeholders	25%
3.1		Develop stakeholder database	
3.2		TAC review of stakeholder database	
3.3		Revise database	
3.4		Develop survey mechanism	
3.5		TAC review of survey mechanism	
3.6		Revise survey mechanism	
3.7		Schedule interviews/surveys	
3.8		Interview stakeholders	
3.9		Summarize findings	
4.0	Inventory CVISN/ITS Service Applications	Identify and collect available applications by technological and functional groups. Arrange for demonstrations applicable to ADOT	15%
4.1		(1) Inventory and classify existing ITS technologies. (2) List additional contacts from ITS America exhibitors and other forums	
4.2		TAC review of the inventory	
4.3		Revise inventory and set up demonstrations	
4.4		Present findings to TAC and demonstration of applications	
5.0	Recommend Package of CVISN/ITS Devices, Equipment, and Software	Recommend CVISN/ITS packages	15%
5.1		Prepare list of CVISN/ITS package	
5.2		TAC reviews list of packages	
5.3		Revise list of packages	

Task Number	Task	Description	Percent of Project
5.4		Finalize recommendations	
6.0	Implementation Plan	Develop schedule and budget for recommended CVISN/ITS packages	10%
6.1		Develop Implementation Plan outline submit to Project Mgr./Project Leader	
6.2		Develop Draft Implementation Plan	
6.3		TAC reviews Draft Implementation Plan	
6.4		Revise and finalized Implementation Plan	
7.0	Final Report	Prepare a report documenting data findings, recommendations and implementation plan.	10%
7.1		Develop Final Report outline submit to Project Mgr./Project Leader	
7.2		Develop Final Report	
7.3		TAC review of the Final Report	
7.4		Revise and submit Final Report	
8.0	Presentation	Present final findings and recommendations	5%
8.1		Identify audience/location for presentation by ADOT	
8.2		Develop draft presentation of project findings	
8.3		Review of presentation by ADOT representatives	
8.4		Finalize presentation	
8.5		Present findings to appropriate audience	

Task	Description	Action	Completion Date
Work Plan	Complete Work Plan		8/30/2002
Literature Review	Research and collect literature, create bibliographies, including summaries of findings, lessons learned significant institutional and operational issues.	Submit to Technical Advisory Committee (TAC)	10/4/2002
	Submit final technical memorandum Deliverable: a chapter or section documenting the findings of this task that is acceptable to the TAC and that will be suitable for inclusion in the final report.		10/8/2002
Survey/Interview Stakeholders	Develop stakeholder database	TAC review of stakeholder database	9/13/2002
	Develop draft survey mechanism	TAC review of survey mechanism	9/13/2202
	Summary of responses from surveys Deliverable: a chapter or section documenting the findings of this task that is acceptable to the TAC and that will be suitable for inclusion in the final report		10/31/2002
Inventory CVISN/ITS Service Applications	Identification and collection of available applications, breaking down the technologies into functional groups.	TAC review of the inventory	10/31/2002
	Present final findings and arrange for demonstrations of components and systems that may be beneficial to ADOT Deliverable: a chapter or section documenting the findings of this task that is acceptable to the TAC and that will be suitable for inclusion in the final report	Present to TAC	Week of 12/02/2002
Recommend Package of CVISN/ITS Devices, Equipment, and Software	Provide alternatives and recommendations of CVISN/ITS packages	TAC Review	12/20/2002
	Final CVISN/ITS package recommendations Deliverable: a chapter or section documenting the findings of this task that is acceptable to the TAC and that will be suitable for inclusion in the final report	Present to ADOT and key stakeholders	1/7/2003
Implementation Plan	Implementation Plan outline to Project Mgr. Project Leader	Submit to Project Mgr./Project Leader	1/7/2003
	Submit draft Implementation Plan	TAC reviews Draft Implementation Plan	1/21/2003

	Submit final Implementation Plan Deliverable: a chapter or section documenting the findings of this task that is acceptable to the TAC and that will be suitable for inclusion in the final report		2/7/2003
Final Report	Final Report outline	Submit to Project Mgr./Project Leader	1/7/2003
	Submit Draft Final Report	To TAC for review	1/21/2003
	Submit Final Report Deliverable: a chapter or section documenting the findings of this task that is acceptable to the TAC and that will be suitable for inclusion in the final report		2/7/2003
Presentation	Provide draft presentation for ADOT representatives	ADOT representatives review presentation	1/14/2003
	Present Findings Deliverable: Presentation to appropriate audience	Present findings to appropriate audience	2/7/2003 or later

APPENDIX B - LITERATURE DATABASE

Within the database, a scale is included as to the relevance of the literature in several categories. The symbols provided display the amount of relevance of the article to the following categories:

- CVISN
- ITS
- Customs
- State
- Federal
- International

Relevance is indicated by a numerical scale, as shown in Table 1.

Table 1 – Relevance Legend

Relevance Rating	Degree of Relevance
0	No Relevance
1	Slightly Relevant
2	Partly Relevant
3	Mostly Relevant
4	Fully Relevant

CVISN
CVISN Guide to Electronic Screening
March 2002

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	4	1	3	1	0

SIGNIFCANT FINDINGS

1. Electronic screening is one of the three key program area in CVISN Level 1
2. There are a variety of technologies that can be applied to electronic screening in support of the commercial vehicle weigh and inspection process. There are also a number of ways in which these technologies can be applied (Dedicated Short Range Communications (DSRC), Weigh In Motion (WIM), Automatic Vehicle Classification (AVC), Vehicle Tracking Loops, Automatic Signing
3. Member states of two major multi-state electronic screening programs, Heavy Vehicle Electronic License Plate (HELP) PrePass and North American Preclearance and Safety System (NorPass), have deployed a number of sites that are currently in operation. The CVISN pilot and prototype states have completed or are in the process of developing electronic systems that meet CVISN Level 1 Requirements.
4. As of the date of this publication, states participating in HELP PrePass do not meet the CVISN Level 1 roadside requirements. The primary shortcomings are not using snapshot data as the basis for safety and credential checks and business policies which prevent national interoperability of electronic screening.

LESSONS LEARNED

1. In making any decision for electronic screening, it is important to consider the motor carrier's interest, along with the state perspective. Participation by the motor carrier community is essential to achieve long-term success.
2. Carrier outreach should begin at the early stages of development in order to build support for the program

INSTITUTIONAL ISSUES

Funding and contracting phase key decisions include:

- How much funding is required to complete the project?
- Where will the funding be obtained?
- How will operations and maintenance (O&M) costs be funded?
- What type of procurement should be used for each product or service?
- What can be done to expedite procurements?
- What type of incentives and remedial mechanisms should be included in the contracts?
- What software rights should be included in the contracts

OPERATIONAL ISSUES
1. The application of electronic screening will be affected by many constraints, including site limitations, availability of support staff and funding. Each roadside check situation is likely to have a unique design due to state policy and practices; traffic flow, volume and number of lanes; available site space; legacy system characteristics; existing proprietary solutions; vintage of roadside facilities and communications equipment; resources available for making changes 2. Another component to standardization of data exchange between state and/or public systems is the use of common data "snapshots." Snapshots contain information that provide a quick picture of carrier/vehicle/driver safety performance history and basic credentials information. Carrier and vehicle snapshots exchange safety and credentials data between state and national systems. 3. Widespread participation in electronic screening programs is encouraged. 4. Electronic screening is provided for vehicles equipped with FMCSA-specified DSRC transponders 5. Screening systems are interoperable with those in different jurisdictions

ARTICLE SUMMARY / SYNOPSIS
The Johns Hopkins University Applied Physics Laboratory in conjunction with the U.S. DOT prepared this guide to provide reference information and to offer advice on implementing electronic screening functions in CVISN.

Arizona CVISN Top Level Design Description
8/29/02

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	4	0	4	0	0

SIGNIFCANT FINDINGS

1. Arizona's CVISN Program is being led by the ADOT Motor Vehicle Division (MVD) and Information Technology Group (ITG). MVD is responsible for credentialing, electronic screening and program administration. ITG will manage all systems integration.
2. All stakeholders have expressed support of the CVISN program initiatives, which are designed to promote the following objectives
   - Improve highway safety
   - Improve state and motor carrier productivity
   - Streamline credential and tax administration
   - Improve regulatory compliance, thereby "leveling the playing field" for already compliant motor carriers
3. ADOT is committed to meeting CVISN Level 1 deployment requirements as well as implementing other projects that are not necessarily part of Level 1 Functionality as defined by FMCSA.
4. Arizona has established guiding principals for its architecture and design to include maintaining existing legacy systems, creating new systems when required, communications protocols will be used, and electronic communications will be done primarily through the Internet.

LESSONS LEARNED

None

INSTITUTIONAL ISSUES

1. General Arizona issues that were documents as part of the CVISN process are:
   - Funding, need matching funds
   - Need commitment for team participation and structural organization
   - Program availability
   - Operations and maintenance funding
   - NAFTA issues and need to configure international border crossing port design ITS elements
   - Limited wireless communications transmission capabilities in sparsely populated areas of the state; limits connectivity for roadside officers.
2. NAFTA issues include:
   - Formalization of a federal-state presence at all six border crossings in Southern Arizona through the establishment of working covenants
   - Adoption of specific port improvement recommendations

- Collaboration between state and federal inspection authorities in the sharing of resources and the joint assignment of port inspectors
- Development of operational strategies and preparedness plans in concert with U.S. and Mexican Government officials and members of the private sector to fully implement the last phase of NAFTA

OPERATIONAL ISSUES

1. Arizona does not have wireless communications in place for real-time PIQ queries or immediate upload of inspections to the SAFER Data Mailbox (SDM) from the roadside. PIQ Queries and inspection uploads to the SDM can be accomplished from some fixed ports; however, many officers will continue to upload inspections to SafetyNet at the end of shift rather than to SDM.
2. Arizona has elected to use the Washington CVIEW, and the state will rely on Washington for its interface with SAFER, at least until SAFER is able to accept XML transmittals. Arizona does not plan to develop an interim EDI interface between its CVIEW and SAFER.
3. Arizona intends to allow IRP and IFTA credentials to print at carrier offices. The state and its vendors have not yet evaluated all of the possible issues associated with distributing plates, cab cards or IFTA decals for, in essence, carrier self-issue.

ARTICLE SUMMARY / SYNOPSIS

In following ADOT's commitment to improving commercial vehicle operations and services, they have provided this report to describe Arizona's CVISN design and deployment. It includes system requirements, system design, operating scenarios and issues with the system.

What Have We Learned About Intelligent Transportation Systems: Chapter 6 - What Have We Learned about ITS from Commercial Vehicle Operations? Status, Challenges, and Benefits of CVISN Level 1 Deployment
December 2000

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	4	0	2	2	1

SIGNIFCANT FINDINGS

1. Three Technology Areas Reviewed:
   - Safety Information Exchange,
   - Electronic Screening
   - Electronic Credentialing.
2. Safety Information Exchange Technologies - Provide more up-to-date safety data to enforcement in the field.
3. Electronic Screening - Operational tests (Advantage I-75), HELP/Crescent (I-5) and Oregon Green Light) have demonstrated the technical feasibility and time-savings benefits of using electronic screening systems for Commercial Vehicle Operations (CVO) DSRC.
4. Electronic Credentialing - offers opportunity for significant cost savings related to motor carrier registration process. Kentucky, has preliminary estimates of savings due to electronic credentialing can be as high as 75 percent. Deployment not at same level

LESSONS LEARNED

1. Collaboration among states in cooperation with Federal Government is key to success
2 State Commercial vehicle enforcement agencies recognize this technology facilitates the inspection process and helps focus inspection resources on high-risk carriers. Programs developed by FMCSA such as CVISN Mainstreaming help to resolve deployment issues.
3. Most states are depending on voluntary participation of motor carriers. The use of license plate readers for automated vehicle identification has not been successful because of low reliability. Carrier enrollment is heavily dependent on solving inoperability.
4. Technical challenges between connecting new system with legacy systems. Several states underestimated the complexity of integrating old legacy system with new systems. Some states relied too heavily on outside contractors without providing agency technicians.

INSTITUTIONAL ISSUES

1. Type and amount of safety information for used during roadside inspections or for selecting vehicles for inspection will change as faster less costly wireless communications becomes available. Continued development and refinement of systems such as Aspen.
2. States must determine criteria to use and must communicate the criteria to carriers and to a degree possible establish uniformity within key corridors. Motor Carriers can be expected to want same bypass criteria as vehicles travel from state to state.

3. Initially CVISN architecture focused on specialized computer-to-computer software. Web-based systems that allow carriers to conduct credentialing business were also being investigated.

OPERATIONAL ISSUES

1. States have encountered no major impediments to widespread deployment of deploy roadside computer with Aspen (software that records, processes inspection data and provides historical information on safety performance), Inspection Selection System (ISS).
2. DSCR transponders need to be compatible with other applications toll collections, and border crossing.
3. (1) Type of data communications that should be adopted. Two standards to use electronic data interface (EDI) of extensible Markup Language (XML). EDI is well established
4. (2) Type of software system (specialized computer programs or Web applications)

ARTICLE SUMMARY / SYNOPSIS

1. Three Technology Areas Reviewed: Safety Information Exchange, Electronic Screening, and Electronic Credentialing. Reviewed deployment status, technology benefits, issues to implementation, success of technology.
2. PrePass uses private capital for infrastructure. NorPass uses state-owned AVI infrastructure. Green Light is constructed and administered by Oregon DOT (Department of Transportation).

Evaluation of the Commercial Vehicle Information System and Networks (CVISN) Deployment Initiative
March 2002

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	4	0	2	3	0

SIGNIFCANT FINDINGS

1. CVISN can produce substantial costs savings for states and motor carriers, improve the efficiency and fairness of commercial vehicle operations, and most importantly, save lives. To achieve these benefits, CVISN must be deployed nationwide according to consistent standards and its major systems must be fully integrated.
2. The CVISN Inspection Selection System (ISS), used in combination with manual prescreening to select commercial vehicles for inspection, was demonstrated in limited field tests to increase the number of out-of-service (OOS) orders issued by 2 percent compared to traditional screening methods.
3. A crash avoidance model estimated that without electronic screening, the use of ISS would result in 84 fewer commercial vehicle crashes per year nationwide by removing unsafe vehicles and drivers from the roadway. Further analysis demonstrated that if ISS were combined with electronic screening approximately 600 commercial vehicle-related crashes could be avoided per year.
4. CVISN safety information exchange and electronic screening technologies can result in significant safety benefits, but only if these technologies are widely deployed, fully integrated, and combined with innovative enforcement and outreach strategies.
5. Annual operating costs to the states for credentialing can be reduced by almost 35 percent, offsetting the start-up costs to deploy CVISN.
6. At least 4 states (Maryland, Virginia, Kentucky, and Washington) have demonstrated Level 1 capabilities in all three areas, and many other states have made significant progress in one or two areas-eight of the 48 contiguous states have been fully funded to achieve Level 1 deployment by September 30, 2003.

LESSONS LEARNED

1. Even though electronic credentialing has demonstrated the potential for significant cost savings, much needs to be done before these cost savings can be realized. Although there is a strong commitment from states to deploy electronic credentialing, only three or four states have achieved any level of success. This is because of the many technical challenges in integrating diverse computer systems. Also, the solution in one state might not be applicable to another because the systems differ from state to state.
2. The CVISN motor carrier survey suggests that most carriers are receptive to the idea of end-to-end electronic credentialing, but questions remain about how the carriers will communicate with the states electronically.

INSTITUTIONAL ISSUES
None

OPERATIONAL ISSUES
1. One of the major issues under consideration by the states as well as the FMCSA is whether to use computer-to-computer interfaces between the sate and motor carriers or a web-based person-to-computer interface.

ARTICLE SUMMARY / SYNOPSIS
This report prepared by Battelle on behalf of the US Department of Transportation is an evaluation of the CVISN Model Deployment Initiative. This presents the goals, methods and findings of the independent evaluation of CVISN benefits and costs.

Memorandum of Understanding between The Arizona Dept of Transportation (ADOT) and The Az Dept of Public Safety, US Customs Service (USCS), US Dept of Agriculture (USDA), US Dept of Transportation (US DOT) - Federal Motor Carrier Safety Administration (FMCSA), US General Services Administration (USGSA), Expedited Processing at International Crossings (EPIC) Phase 2, Commercial Vehicle Operations/Traffic Management System, Nogales, Arizona POE - Mariposa Federal and State Complexes
August 2002

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	4	2	2	2	2

SIGNIFCANT FINDINGS

1. Slow Weigh in Motion (SWIM) is already in place. Epic will integrate and store SWIM and AVI information to link the weight information with vehicle identification. U.S. Customs uses digital CCTV will expand to include additional cameras/server for ADOT and other regulatory agencies. Automated Vehicle Identification System (AVI) - all data collected in the compound will be linked to the proper vehicle and driver.
2. Dynamic Message Signs (DMS) will be installed within compound to assist with the traffic management and control. Digital Imaging Equipment captures images of vehicles and drivers as they are tagged (vehicle numbers, wheels, lug nuts). Database System store all data gathered in compound. Data is from various electronic and keyed entries. Communication System Fiber optics and twisted pair copper wire connect the LAN between buildings, includes ITS field controllers and cabinets

LESSONS LEARNED

None

INSTITUTIONAL ISSUES

None

OPERATIONAL ISSUES

None

ARTICLE SUMMARY / SYNOPSIS

1. The Memorandum of Understanding provides the framework and guidelines to promote and coordinate the project development, implementation, and operations/maintenance of ITS technologies at the Nogales Port of Entry for commercial vehicles.
2. Goal: enhance the overall efficiency and effectiveness of commercial border-crossing operations and reduce impacts on institutional and legal barriers.
3. Objectives: (1) Implement electronic and high-tech commercial vehicle processing systems. (2) Deploy ATMS (3) Provide info dissemination system for vehicle and driver.

CVISN - Executive Summary Model Deployment Initiative (MDI) Summary Evaluation Plan John Orban (Battelle) Daniel Brand (Charles River Associates) SCOTT Amey (RS Information System) John Kinateder (Battelle
July 1998

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	4	0	3	0	0

SIGNIFCANT FINDINGS

1. Key features deployed: Credentialing Administration - (1) End-to-end electronic application and processing of credentials (electronic submittals, direct links to legacy systems, edit checks, fee calculation, invoice generation, fund transfer, and production of credentials). (2) Use of PC versus Web for Carrier Automated Transaction System (CATS) for credential applications submission. (3) Printing credentials (permanent or temporary) if carrier offices. Especially for oversize/overweight. (4) Interface with International Registration Plan (IRP) and International Fuel Tax Agreement (IFTA) clearinghouses.
2. Roadside Enforcement (Electronic Screening and Safety Information Exchange) - (1) Mainline screening for weight, credentials, and safety. (2) Sorter Lane screening using AVI. (3) Mobile units equipped with networked screening data, (4) Real-time access to screening data at fixed sites and in mobile units (5) Facilities for screening on bypass routes.

LESSONS LEARNED

1. Evaluation strategy identified safety benefits rated the highest importance, next was efficiency. Mobility productivity, and energy/environment, in that order were rated lower.

INSTITUTIONAL ISSUES

None

OPERATIONAL ISSUES

None

ARTICLE SUMMARY / SYNOPSIS

Demonstrates the technical and institutional feasibility, costs, and benefits of the primary Intelligent Transportation systems (ITS) user services for commercial vehicle operations (CVO) and to encourage further deployment of these services

INTELLIGENT TRANSPORTATION SYSTEMS
Intelligent Transportation Systems at International Borders – A Cross-Cutting Study, April 2001
APRIL 2001

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	2	0	2	3	0

SIGNIFCANT FINDINGS

1. The International Border Clearance Program (IBC) has led to the development of interfaces with state commercial vehicle information systems being developed and deployed under the FHWA ITS/Commercial Vehicle Operations (CVO) program.
2. The IBC vision—The seamless, harmonized, and timely clearance of international commerce between and through trading countries resulting in safe and legal commercial operations

ARTICLE SUMMARY / SYNOPSIS

The purpose of the study was to identify examples of how IBC has made progress toward its goals of facilitating trade and enhancing safety. The study represents findings from field operational test (FOT) evaluation reports, and during interviews with federal, state, and industry officials at six border crossing sites, including Nogales, AZ. This study was performed by the U.S. DOT - Federal Highway Administration and Federal Transit Administration.

BORDER CROSSING FACILITY AT BLAINE, WA

LESSONS LEARNED

1. Competing CVO electronic screening cooperatives prevent progress toward international interoperability.
2. Planners should develop long-term, sequential deployment schedule that allows for incremental funding and demonstration of capabilities.
3. Non-traditional partnerships are not fully accommodated by the state planning process.

INSTITUTIONAL ISSUES

1. State and Federal transportation and custom agencies have different roles and focus areas.
2. Obtaining funding for and conducting coordination of property and infrastructure improvements related to transportation in non-transportation compounds is complex.
3. Traditional funding agreements are not universally applicable, requiring creativity and flexibility, particularly with regard to multiple currencies and procurement laws.

OPERATIONAL ISSUES

1. Limited knowledge regarding life-cycle, operations, and maintenance costs of technology improvements makes obtainment of funding commitments difficult.

BUFFALO, NY--PEACE BRIDGE

LESSONS LEARNED
1. The system installed at the bridge has the potential to improve the level of service to both freight providers and people crossing the bridge into the U.S. 2. Because expediting the flow of traffic is a goal not always consistent with the missions of agencies responsible for regulating cross-border movements, seamless cross-border movement is not a universally shared priority.

INSTITUTIONAL ISSUES
None

OPERATIONAL ISSUES
1. With no U.S weigh scales on the Canadian side, trucks exceeding the bridge weight limits will cross unimpeded. 2. Increasing trade volumes, road access design issues and limited space combine to create significant congestion

DETROIT, MI—AMBASSADOR BRIDGE (THE SYSTEM USED FOR THIS BRIDGE IS THE AMBASSADOR BRIDGE INTERNATIONAL BORDER CROSSING SYSTEM (ABBCS)

LESSONS LEARNED
1. Systems installed as part of the field operational test (FOT) proved the technical feasibility of expedited border crossings. 2. Simulation results indicate that the Dedicated Commuter Lane concept has the potential to positively impact traffic on the bridge, provided all equipped lanes are open to all vehicles

INSTITUTIONAL ISSUES
1. Multiple agency points of contact for statewide CVO make it difficult to obtain uniform guidance from agencies responsible for administration and enforcement. 2. Legal requirements in Michigan do not yet allow the selection of high risk vehicles and drivers for inspection using electronic records, which is counter to the ITS/CVO objective to target high-risk carriers.

OPERATIONAL ISSUES
1. Space constraints prevent vehicle safety and compliance inspections from being conducted on the bridge facility and support development and use of FTPS and CVISN.

LAREDO, TX PORT OF ENTRY

LESSONS LEARNED
1. Limited resources are available to the TX DPS for facilities, technology, implementation and staffing. 2. Laredo has multiple high-volume crossings, which demand innovative technological solutions. 3. Laws permit the application of discretion in selecting vehicles for inspection. 4. Large trade volumes and limited enforcement resources make Laredo well suited for FTPS and ITS/CVO technology implementations. 5. The largest improvements at Laredo crossings will come from replacing the drayage system that has been institutionalized between the US and Mexico distribution centers.

INSTITUTIONAL ISSUES
None

OPERATIONAL ISSUES
None

NOGALES, AZ PORT OF ENTRY

LESSONS LEARNED
1. The EPIC system has the potential to significantly reduce the amount of time spent in the border compound. 2. Utilizing the Superbooth reduced the average approximate travel time through the compound by over 80%.

INSTITUTIONAL ISSUES
1. Insufficient financial resources preclude the operation to fixed weigh stations at all ports. 2. State representatives support technological innovation to facilitate faster processing and enhance safety.

OPERATIONAL ISSUES
1. There is no hazardous materials containment area at any of the existing Arizona ports (one site planned at time of study)

OTAY MESA, CA PORT OF ENTRY

LESSONS LEARNED
1. The layout of an international border compound and the operations within it, present a challenge in implementing current DSRC systems in a border environment 2. Test results indicate that an RF (radio frequency) network is capable of supporting basic information exchange requirements; it is unclear whether higher transaction volumes could be sustained. 3. Participant carriers indicated they saw potential for IBEX technologies to enhance operations, but that improvements to surrounding processes would be necessary.

INSTITUTIONAL ISSUES
None

OPERATIONAL ISSUES
1. The initial investment associated with equipping vehicles with transponders was considered acceptable, provided that processing paper-based transactions in parallel was eliminated. 2. Participating carriers believed that as congestion at the border increases, participation in automated preclearance programs will make the difference in the efficiency and competitiveness of their operations.

Interim Report on Customs Automated Commercial Environment (ACE) Program Management: Customs Needs to Adequately staff Modernization Office
March 4, 2002

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
0	0	4	0	4	4

SIGNIFCANT FINDINGS
1. Purpose of the report is to recommend improvements to the management of the ACE development. Program still in Requirements and Planning Phase.

LESSONS LEARNED
None

INSTITUTIONAL ISSUES
1. 9/11/2001 increased the planning needed for the requirements. International Trade Data System (ITDS) is not being incorporated as a Task order for ACE. ACE development schedule is reduced to four years.

OPERATIONAL ISSUES
None

ARTICLE SUMMARY / SYNOPSIS
Recommend improvements in the management of the Automated Commercial Environment (ACE) development.

Ambassador Bridge Border Crossing System (ABBCS), Field Operational Test
May 2000

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	0	0	2	0	4

SIGNIFCANT FINDINGS

1. The systems installed as part of the operational test demonstrated that the provision of expedited border processing was technically feasible.
2. According to the results of a detailed simulation conducted by Mitretek Systems, the implementation of a system like the ABBCS, in combination with a carefully selected lane assignment scheme has the potential to significantly reduce the length of vehicle queues during peak arrival periods.
3. At the most basic level, this program demonstrated that it is possible for law enforcement officials at or near the border to access information regarding specific vehicle, carrier, operator, and cargo data that was not previously available.
4. Due to the nature and duration of the operational test, it was expected that any benefits that would be likely to accrue to bridge users and other stakeholders would not necessarily be immediately apparent. Specifically, because import processing using ABBCS was conducted in parallel with, rather than in place of current processes, bridge users were more likely to experience additional workload and delay that any efficiency benefits.
5. Survey and interview findings clearly indicate that the willingness of bridge users to enroll in and use ABBCS and SENTRI/DCL systems is a direct function of the amount of direct benefit they expect to accrue.

LESSONS LEARNED

1. The most significant technical lessons pertained to transponder battery life, and Dedicated Commuter Lane (DCL) card reader environmental sensitivity.
2. Reconfiguring the compound entry to accommodate two lanes of truck traffic would be likely to have a much more profound effect on traffic that the implementation of ABBCS.

INSTITUTIONAL ISSUES

1. Information management: the primary issue here stems from concern on the part of the carrier community regarding the collection, use, and protection of information not specifically required by law, and liability regarding inaccurate data. This issue is not unique to the border environment, and receives regular attention in most ITS or CVO forums.
2. Inter-jurisdictional coordination: the significant issues here involve the adoption and use of standards that promote interoperability, particularly with regard to Dedicated Short Range Communications (DSRC), and the issues of sharing information across jurisdictions. These issues are significant, but they also enjoy considerable visibility among the stakeholders.
3. Sustainability: this refers to the ability of the ABBCS and similar systems to provide incentives significant enough to attract users, and thus become a worthwhile investment of public and private funds.

OPERATIONAL ISSUES
None

ARTICLE SUMMARY / SYNOPSIS
The purpose of this field operational test (performed by Booz Allen Hamilton) was to demonstrate the ability of ITS technology and to expedite safe and legal international border crossings for both commercial and commuter vehicles in an operational environment. The objective was to develop and demonstrate an integrated system that would allow pre-processed vehicles, trade goods, and commuters to pass through international border check points quickly and efficiently.

GAO Customs Service Modernization Management Improvements Needed on High-Risk Automated Commercial Environment Project
May 2002

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	0	2	0	2	0

SIGNIFCANT FINDINGS

1. Customs' February 2002 ACE spending plan is the second in a series of legislatively required plans. This plan covers certain project management tasks as well as the definition, design and development of the first ACE increment. GAO found that the plan meets the legislative conditions that Congress imposed on Customs and is consistent with GAO's open recommendations. Nevertheless investment in ACE is a high-risk endeavor.
2. The system's size, performance parameters, and organizational impact make it technically and managerially complex.
3. Customs fell short of key commitments made in its first spending plan because it severely underestimated costs.
4. Customs needs to update its enterprise architecture to support system design and development.
5. Customs is taking a schedule-driven approach to acquiring ACE. However, without the management capacity to effectively acquire such a large and complex system, this approach could backfire.
6. Full system capabilities may take longer and cost more to acquire, deploy and make operational, because the system delivered under the accelerated schedule could require considerable rework.

LESSONS LEARNED

7. To increase the chances of delivering needed system capabilities on time and within budget, GAO is making recommendations to the commissioner aimed at improving Customs' management of ACE, including strengthening system alignment with Customs' enterprise architecture, cost estimating, human capital capacity, software process maturity, and sequencing of incremental releases.

INSTITUTIONAL ISSUES

None

OPERATIONAL ISSUES

None

ARTICLE SUMMARY / SYNOPSIS
The US Customs Service is in the early stages (May 2002) of a multiyear, multibillion-dollar project: the Automated Commercial Environment (ACE), a new import processing system that is to support effective an deficient movement of goods into the United States. By Congressional mandate, Customs' spending plan s for ACE must meet certain conditions, including being reviewed by GAO. In this study, GAO addresses whether Customs' latest plan satisfies congressional conditions and is consistent with open GAO recommendations, and it identifies opportunities for strengthening project management.

Arizona PRISM Implementation Project Plan
April 3, 2000

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	0	0	4	0	0

SIGNIFCANT FINDINGS

1. PRISM will help to provide valuable resources to promote and monitor the safety of commercial carriers.
2. Arizona planned to implement the project for interstate vehicles initially, however DPS expressed concerns over the safety compliance of intrastate carriers as well.
3. The plan allows for the cross utilization of some resources and the phase in of intrastate carriers by requiring the use of the USDOT numbers for all interstate carriers and including these carriers in the local PRISM census file.
4. One full-time employee will serve as an expert in the MCMIS database.
5. The plan calls for the enhancement of three databases--TransPort System, which issues permits at Ports of Entry; the Title and Registration (T&R) System, which houses all vehicle and carrier/individual information; and VISTA, the IRP database, which interfaces with T&R.
6. Installation of 4 license plate readers is also included.
7. The project plan calls for Registration Requirements and Enforcement Requirements covering participant identification, staff and participant training.

LESSONS LEARNED

None

INSTITUTIONAL ISSUES

None

OPERATIONAL ISSUES

None

ARTICLE SUMMARY / SYNOPSIS

The Arizona Department of Transportation entered into an intergovernmental agreement with the Department of Public Safety to ensure the continued cooperation and completion of the PRISM project. This Implementation plan provides all the details on how PRISM will take shape.

EXPEDITED PROCESSING and International Crossing (EPIC) Test & Evaluation Strategy
February 5, 1996

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	0	0	3	4	2

SIGNIFCANT FINDINGS

1. The objective of the EPIC Project is to expedite commodity movements through the extensive use of Electronic Data Interchange (EDI) and the automation of manual process currently used to monitor commercial vehicle movements at the border.
2. The Commercial Vehicle Electronic Clearance User Service will be the focus of this operational test.
3. Systems that will be used include:
   - EDI
   - Vehicle Roadside Communications
   - Commercial Drivers License Information System (CDLIS)
   - License Plate Recognition (LPR)
   - Weigh In Motion (WIM)
   - SafetyNet
   - Management Information System for Transportation (MIST).
4. Services it will provide include:
   - Driver Processing
   - Vehicle Processing,
   - Cargo Processing
   - Traffic Management
5. The EPIC work plan is comprised of 5 sequential phases to achieve early/incremental accomplishments
   - Phase 0 - Initiation
   - Phase 1 - System Prototyping
   - Phase 2 - Trip Permitting Implementation
   - Phase 3 - Cargo Seals and WIM Implementation
   - Phase 4 - Traffic Management System Implementation

LESSONS LEARNED

None

INSTITUTIONAL ISSUES

None

OPERATIONAL ISSUES
1. Can advanced technologies be applied in such a way to make it possible for commercial vehicles to cross international borders without stopping? 2. Can common international border crossing processes and information requirements be developed and implements between the U.S. and Mexico? 3. Will border inspectors allow electronic systems verifications of cargo, driver, and vehicle entry and exit requirements to replace manual process, except in the case of random inspections?

ARTICLE SUMMARY / SYNOPSIS
This FHWA presentation is stating that the EPIC project will demonstrate an electronic trip clearance system to accelerate commercial vehicle traffic through the Nogales, Arizona border crossing site.

DRAFT VERSION D.2, Commercial Vehicle Information Systems and Networks (CVISN), International Border Clearance (IBC) and National ITS Architecture Alignment December 2001

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	2	0	0	2	2

SIGNIFCANT FINDINGS
1. FHWA and FMCSA determined that a separate IBC Architecture will not be maintained and that the National ITS Architecture shall govern IBC-related deployments.

LESSONS LEARNED
1. Changes to the CVISN Architecture described in this document are necessary to bring it into alignment with the National ITS Architecture, including the National ITS Architecture's IBC components.

INSTITUTIONAL ISSUES
1. If a new user service requires intermodal functions be added to the National ITS Architecture, then the existing intermodal architecture flows are likely to be modified. As these and other flows are added and/or modified, the National ITS and CVISN Architecture teams will coordinate changes to that the architectures remain aligned.

OPERATIONAL ISSUES
None

ARTICLE SUMMARY / SYNOPSIS
Describes the changes made to CVISN Architecture resulting from the three-way alignment of National ITS, CVISN, and IBC Architectures.

International Border Electronic Clearance (IBEX) Test and Evaluation Strategy
February, 1996

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	0	0	2	1	2

SIGNIFCANT FINDINGS

1. The objective of the CVO Preclearance System for International Border Crossings is to provide accredited service to both the border officials/agencies and commercial fleet users that allows selected vehicles to pass the international border check points without stopping, or with expedited inspections.
2. The heart of the IBEX system is the in-vehicle data processing interface unit, or DPIU.
3. The IBEX Project will require the integration of existing technologies into a seamless system that meets the operating and institutional requirements of both the U.S. and Mexico.

LESSONS LEARNED

None

INSTITUTIONAL ISSUES

None

OPERATIONAL ISSUES

None

ARTICLE SUMMARY / SYNOPSIS

This FHWA presentation is relaying the thought that the IBEX project will demonstrate an electronic border clearance system to accelerate commercial vehicle traffic through the Otay Mesa, California crossing site.

Advantage I-75 Mainline Automated Clearance System (MACS)
August 1998

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	0	1	3	0	0

SIGNIFCANT FINDINGS

1. The objective of the Advantage I-75 MACS operational test is to permit compliant transponder-equipped trucks to travel any segment of the I-75 and Highway 401 corridor at mainline speeds while being cleared to bypass the weigh stations along the corridor.
2. Goals of the project include:
   - To increase industry and state productivity
   - To improve safety
   - To reduce congestion
3. While the fuel savings generated from a single stop were minimal, the accumulated benefit from reduced stops at a weigh station were significant.
4. The principal conclusion from this experiment is that there are measurable time savings obtained by electronic screening of commercial vehicles.

LESSONS LEARNED

1. In order to facilitate the implementation of the system, technical standards and information sharing must be agreed to early on in the project and there must be "buy-in" from upper management in order to succeed.

INSTITUTIONAL ISSUES

None

OPERATIONAL ISSUES

None

ARTICLE SUMMARY / SYNOPSIS

The Center for Transportation Research and Education at Iowa State University prepared this report on the Advantage I-75 MACS. It details the evaluation, consisting of four tests to determine the effectiveness of electronic clearance of commercial vehicles at weigh stations. The tests are fuel consumption, a weigh station throughput test, a simulation model and an examination of jurisdictional issues.

Oregon Green Light CVO Evaluation Final Report
April 2001

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	0	0	3	0	0

SIGNIFCANT FINDINGS

1. Through Green Light, Oregon has installed twenty-one mainline systems featuring weigh-in-motion (WIM) devices and automatic vehicle identification (AVI) at the major weigh stations and ports-of-entry in the state.
2. It is important to note that over the course of the evaluation period, from January 1998 to July 1999, there was a low transponder penetration in relation to the total traffic bypassing the Green Light facility at Woodburn POE. At the end of the data collection period for this study in July 1999 there were approximately 3000 transponders in the field, less that the amount needed to actually show a change in compliance as a result of Green Light. This number increased substantially to over 10,000 transponders in the field in July 2000. Green Light bypasses also increased dramatically from about 28,000 in July 1999 to approximately 60,000 by July 2000.
3. The simulation findings indicate that electronic screening will reduce travel time and fuel consumption for trucks participating in the electronic screening programs, or transponder equipped trucks. Findings also indicate that electronic screening will decrease the occurrence of unobserved bypasses resulting from full queues and increase the percentage of trucks being screened for safety and compliance.
4. The Green Light Project was initiated in 1995 to fulfill Oregon's visions of creating an automated and intelligent truck transportation system. As the project near completion, it has proved successful, by improving the safety and efficiency of the commercial trucking industry while at the same time increasing the performance of roadside facilities without physically expanding them, and protecting the public investment in the infrastructure.
5. By implementing Green Light systems, Oregon identified and stopped more overweight trucks than previously. Without Green Light, these trucks would proceed with the potential to cause millions in highway pavement damage.

LESSONS LEARNED

1. Operating a heavy truck has been estimated by the ATA to cost $1.92 per mile. Assuming an average hourly speed of 39 miles-per-hour, a cost of $1.24 per minute is realized. Truck drivers save at least three minutes per weigh station bypass. Therefore it is conservatively projected, based on the current rate of about 60,000 bypasses a month in Oregon, that in the next 10 years the Green Light mainline system is expected to pre-clear 7.2 million trucks. This will save the industry more than $25 million in operating costs as it save 360,000 hours of travel time. However, it is anticipated that the number of bypasses will increase substantially as more carriers enroll, resulting in much larger savings.

INSTITUTIONAL ISSUES
None

OPERATIONAL ISSUES
None

ARTICLE SUMMARY / SYNOPSIS
This report, prepared by the Transportation Research Institute (Oregon State University), presents a summary of the findings of all the Detailed Test Plans conducted for the evaluation. Each of the goals addressed one of five goals, including: • Assessment of safety • Assessment of productivity • Assessment of user acceptance • Assessment of mainstreaming issues • Assessment of non-technical interoperability issues

International Border Electronic Clearance - IBEX, Evaluation Report
July 1998

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	0	1	2	3	4

SIGNIFCANT FINDINGS

1. The implementation of systems such as IBEX and NATAP represent positive change from a border operations perspective, and potentially negative change from the perspective of commercial interests.
2. The RF local area network (LAN) used during the test functioned well, in spite of concerns regarding reliability and potential interference. This type of network continues to offer the necessary connectivity in instances where port disruption due to construction must be minimized. The Type III transponders used for the test functioned reasonably well. The transponder power source is one important discriminator in overall performance within a DSRC rich environment where extended exposure to instruments is likely.
3. The IBEX Operational Test provided the trade community and regularity agencies with services and technologies that demonstrated electronic solutions to current border crossing and commercial vehicle safety processes.
4. The purpose of the Traffic Facility Integrated Communications (TRAFIC) subsystem was to provide the capability to read the transponders on approaching vehicles, pass the received information to external systems, control the Customs inspector interface and relay the inspector actions to the external system, and finally to control the traffic signal in response to messages from the external system or the inspector action.
5. The on-vehicle dedicated short range communications (DSRC) consisted of a Hughes Type III transponder--the purpose was to provide a DSRC information exchange media that stored information and provided that information upon demand to DSRC readers at regulatory agency decision points. The transponder stored or provided information specific to the vehicle on which was installed, in addition to other required information such as driver, carrier, and cargo data.

LESSONS LEARNED

1. The early interface of the IBEX computer system with the US Treasury LAN at the custom's compounds was an area of concern for those administering Treasury's network. The concern was alleviated by the installation of a remote server and local NATAP client that also performed as a firewall for interfacing systems, such as the IBEX TRAFIC hub. TRW network outages periodically caused drop-outs in the exchange of data and information between the Customs' system and the TRAFIC hub.
2. Chain link metal fencing is reported to interfere with antennae performance. The position of antennae and their respective read zones in conjunction with metal fencing needs to be considered prior to installation. Mounting of antennae on existing infrastructure in not always the best solution for optimum performance. Separate supports that place the instruments at locations that provide for optimal performance should be considered prior to installation.

INSTITUTIONAL ISSUES

1. International border business has bee created based on inefficiencies in the border crossing system. There are many interdependent relationships, such as that between the drayage operators and the customs brokers. If all this border business went away, there would be serious economic impacts along the border regions. There is a need to identify what would be serious economic impacts on the border communities and identify some means to mitigate adverse impacts without hampering efforts to improve efficiency of process.
2. Two major government entities provided instruction, guidance, oversight and funding toward the IBEX project--US Treasury Dept and US Dept of Transportation--and each had a somewhat different focus. Treasury's primary mission was to track movements across the international border for accurate trade information and to minimize contraband. US DOT's primary mission was to ensure safety of vehicles, drivers and the public while facilitating international goods movement. Coordination is needed to ensure that standards, protocols, and approaches pursued in each effort do not create unnecessary hardships for the creation of other border systems and participation in border processes.

OPERATIONAL ISSUES

1. With processes so heavily instituted into the border crossing business, some process change will be required in order to improve efficiency and improve integration of technology into the changing processes. There is a continued need to explore ways for businesses to file required paperwork to provide the information necessary for border clearance in as efficient a means as possible. Even with the introduction of technology solutions, businesses are still doing things the old way. Public and private systems need to be sufficiently integrated in order to remove the need for parallel processing and add real value to the expedited border crossing process.

ARTICLE SUMMARY / SYNOPSIS

This is an evaluation of the International Border Electronic Crossing (IBEX) system implemented in an operational test. Its intent was to demonstrate the integration of electronic information systems and technologies aimed at facilitating the safe, efficient movement of goods between the United States and Mexican North American trading partners.

Coutts / Sweetgrass Automated Border Crossing Phase I
March 1999

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	0	2	2	2	4

SIGNIFCANT FINDINGS

1. For an automated border crossing system to work effectively, close cooperation is needed between the various agencies involved with border crossing activities on both sides of the border.
2. To encourage inter-jurisdictional coordination, one must have a clear understanding of the stakeholders involved with commercial vehicle operations and their respective roles. Numerous regulatory and enforcement agencies can be involved in international border crossing activities. Involvement from transportation, customs and immigration, and other agencies occurs to differing degrees. Industry is also a major stakeholder with respect to international border activities.
3. Following each Oversight Committee meeting, the Western Transportation Institute (WTI) would have contacted members of the Oversight Committee to survey their knowledge and understanding of this project. These survey results would not have been statistically analyzed because of the small sample and potential bias resulting from such a targeted sample. However, these survey results would have provided MDT and WTI insight as to their agencies' effectiveness in involving project constituents.
4. The CVISN initiative and the Mainstreaming imitative will support technology deployment in the areas of safety assurance, credentials administration, electronic screening, and carrier operations. CVISN will provide the technical infrastructure to link these projects and information systems, including common standards and electronic communication among participating agencies and carriers. The Mainstreaming initiative will provide the organizational infrastructure to support ITS/CVO deployment including state and regional ITS/CVO forums and business plans.
5. A primary CVISN goal is to ensure that the vast majority of CVO business transactions are handled electronically by the year 2005. To achieve this primary goal, the CVISN Model Deployment Initiative is underway to move the CVISN architecture from the concept stage into operation.
6. The International Border Clearance Program (IBC) is a federally sponsored program that provides a focused effort to implement ITS/CVO technologies at international borders. The objectives of the IBC program are to:
7. Streamline border clearance regulatory and enforcement process
8. Reduce the information burden on private industry
9. Deploy ITS technologies that are interoperable between IBC functions and transportation functions
10. Achieve repeatable and predictable IBC operations

11. Realize cost effective solutions that easily integrate with existing public and private infrastructure and minimize investment by the various stakeholders

12. The North American Trade Automation Prototype (NATAP is a national program that brings together Customs border crossing regulatory and enforcement activities at a national level. NATAP attempts to standardize the processes that occur when a vehicle enters or exits the US from a Customs perspective. It is a model for how customs will be processed in the future. Nogales POE was one site where NATAP efforts were initially focused.

LESSONS LEARNED

1. ITS/CVO implementation has been prevented or significantly delayed by the lack of standards for a wide range of subjects:
   - In-vehicle/on-vehicle devices
   - Communications protocols (both between vehicles and the roadside and between different jurisdiction computers)
   - Data formats
   - Forms and procedures
   - Information collection and data transfer
   - Penalties for non-compliance

INSTITUTIONAL ISSUES

1. In general, ITS/CVO challenges relate to the following:
   - Differing perspective and philosophies
   - Legislative, regulatory, and organizational limitations
   - Lack of motivation and leadership
   - Communications
   - Funding and resource limitations
   - Automation constraints
   - Standards

OPERATIONAL ISSUES

None

ARTICLE SUMMARY / SYNOPSIS

1. This project was intended to result in a fully automated international border crossing facility that addressed regulatory and enforcement needs of the Montana Dept of Transportation, Alberta Transportation and Utilities, US and Canadian Customs, and US and Canadian Immigration and Naturalization, while improving the operational efficiency of the commercial vehicle industry utilizing this crossing.

8. This report was to document the full Phase 1 implementation process. However, challenges of an institutional nature prevented the successful completion of Phase 1 and precluded the continuation of efforts into subsequent project phases. This report includes a description of proposed project methodology, a summary of national initiatives and site-specific efforts, a description of institutional challenges and conclusions and recommendations.

EPIC Expedited Processing at International Crossings - Evaluation Final Report
September 1998

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	0	1	4	1	3

SIGNIFCANT FINDINGS

1. The original EPIC scope of work was changed several times in response to infrastructure and regulatory changes. These changes affected both the EPIC implementation and the evaluation process. These changes included: US Customs withdrawal form EPIC, Infrastructure changes, and Arizona regulatory changes.
2. The EPIC solution combined proven, low cost technology (through the use of existing commercial vehicle operations software) and the use of the Internet to provide a blend of expedited processing and compliance monitoring.
3. Each truck that participated in EPIC was equipped with a transponder mounted on the inside of the windshield. An identification number was then read by an automated vehicle identification (AVI) reader at the Mariposa compound to identify the truck, activate the EPIC system and communicate with the driver.
4. The EPIC partners of ADOT, Lockheed Martin IMS, and the American Trucking Associations Foundation, identified and recruited companies and drivers. Companies were identified through meetings with the brokers' association and direct company contacts.
5. In addition to issuing single trip permits, EPIC provided other informational services accessed via the EPIC web pages, including: shipment notification, Mariposa traffic conditions, individual truck information.
6. In general, it appears as though the EPIC concept did have the potential to lessen the processing time for vehicles through the compound area, and therefore reduce vehicle travel time for the compound design and traffic flow pattern that existed when the system technology design was first conceived. The EPIC test did not provide an ideal environment for the quantitative analysis of travel time through the compound area and as assessment of the impact of EPIC on travel time.

LESSONS LEARNED

1. The pre-clearance of vehicles to use the SuperBooth and avoid entering the compound had the single most dramatic impact on travel time through the compound area for commercial vehicles. This feature alone reduces travel time by approximately 25 minutes on average (83 percent) in comparison to entering the compound for transponder equipped vehicles not using EPIC. EPIC vehicles using the SuperBooth had a 21 percent lower travel time than the non-EPIC vehicles that participated in the test (on average, approximately a one minute time savings).
2. The physical and operating conditions of the FOT need to be controlled and held constant during the design implementation and evaluation phases of the test. When it is not possible to control changes, their effect on the system design and the evaluation process should be communicated to the FOT participants.
3. The data collection plan for the evaluation should not rely entirely on the FOT technologies to provide the required data. At a minimum, the evaluation design should be considered when developing the system design.

INSTITUTIONAL ISSUES

None

OPERATIONAL ISSUES

None

ARTICLE SUMMARY / SYNOPSIS

1. The EPIC focus was on the commercial vehicle transport component of international border crossings at the Nogales, Arizona POE. Commercial vehicle transport included state border crossing requirements of motor carriers, trucks, trailers and drivers. The goal for EPIC was to expedite the border crossing process by 1) providing for electronic pre-clearance for State of Arizona entry requirements of carriers and drivers and, 2) providing Nogales border traffic congestion and queuing information to carriers and shippers. Arizona administrative requirements for commercial vehicles include: vehicle registration, safety verifications, fee payments, tax and insurance compliance, and permit issuance.
2. The purpose of the FOT was to evaluate EPIC technologies and services under actual operating conditions. Formal technical evaluations of operational tests are conducted to ensure that, once the test in concluded, sufficient information will be available to guide future development and deployment decisions.

A Guide to Developing a Regional ITS/CVO Coordination Plan
August 1997

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	0	0	4	2	0

SIGNIFCANT FINDINGS

1. A regional ITS/CVO Coordination Plan outlines a strategy for the deployment of Intelligent transportation Systems (ITS)/Commercial Vehicle Operations (CVO) technologies by a group of states with common economic and transportation needs.
2. The plan defines strategies to ensure that future deployments of ITS/CVO systems are consistent with the CVISN architecture and compatible across states.
3. The development of a Regional ITS/CVO Coordination Plan is a critical step toward ensuring safe and efficient commercial vehicle operations nationwide.
4. Regional collaboration facilitates the deployment of interoperability systems that can serve motor carriers who operate in more than one state.

LESSONS LEARNED

1. The model Regional Coordination ITS/CVO Coordination Plan will include an overview of the business planning process, a description of the region, a strategic overview, a program summary, and an approach to organization and management.
2. Producing a Regional ITS/CVO Coordination Plan involves establishing a coordination plan steering committee, defining a strategic overview for the coordination plan, reviewing constituent state ITS/CVO business plans, reviewing other key background documents, defining multi-state projects and documenting the coordination plan in a report.

INSTITUTIONAL ISSUES

None

OPERATIONAL ISSUES

None

ARTICLE SUMMARY / SYNOPSIS

This guide to developing a regional ITS/CVO coordination plan was prepared by Cambridge Systematics for the FHWA. It outlines the necessary steps to developing the plan for deployment of ITS/CVO technologies.

ITS Sheet 6: ITS Puts Freight Information Ahead of Freight Movement (FHWA-OP-01-013)
2001

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	0	3	0	2	0

SIGNIFCANT FINDINGS

1. First project addresses efficiency and security of freight movement from manufacturer to customer - use of biometric "smart cards" to confirm the identity of the driver using a sorted thumbprint and to provide information about the seal on the cargo, the driver was transporting.
2. The second addresses efficiency and security of freight movement across international borders among trucking and marine carriers. Using electronic container seals to monitor the security of containerized freight across international borders. Helps automate clearance and credentialing of commercial vehicles through ports and terminals.

LESSONS LEARNED

1. Purpose is to decrease congestion, and thus operating costs by providing information that allows freight movement organizations to identify and avoid transportation bottlenecks.

INSTITUTIONAL ISSUES

None

OPERATIONAL ISSUES

1. A seal that meets the requirements of both U.S. and Canadian custom officials has not been found.

ARTICLE SUMMARY / SYNOPSIS

1. Provides a status of two intermodal freight operational tests.
2. Purpose is to decrease congestion, and thus operating costs by providing information that allows freight movement organizations to identify and avoid transportation bottlenecks.

Electronic Cargo Seals: Context, Technologies, and Marketplace - Michael Wolfe, North River Consulting Group
July 12, 2002

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
2	0	2	0	2	2

SIGNIFCANT FINDINGS
1. E-seals have the potential to improve both freight transportation security and productivity. Very few electronic seals in use today.

LESSONS LEARNED
1. The E-seal market is still in the early stages of development, no one technology has come to the forefront.

INSTITUTIONAL ISSUES
1. Institutional issues include: There is no global frequency set aside for radio frequency identification (RFID). Cost is a major concern to the users - who are concerned with who will pay for the cost.

OPERATIONAL ISSUES
1. Many believe that frequency has inherent performance problems in freight terminals. Many stakeholders feel that the 5800-5900- MHz favored by the ITS community for DSRC, applications is inappropriate for freight terminal and warehouse applications. Users concerns include: Effectiveness - does e-seal perform as advertised and operating practice - business practices would have to be modified with the use of e-seals. Recycling seals would include, removing, collecting, and accounting for devices. This also includes having seals at the correct location.

ARTICLE SUMMARY / SYNOPSIS
This article is an overview of the electronic cargo seal market. It provides rationale for electronic seals, types of e-seals, and the current marketplace (price, product development status, future needs).

Final Report Assessment of Automated Data Collection Technologies for Calculation of Commercial Motor Vehicles Border Crossing Travel Time Delay - Battelle
April 2002

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
3	0	2	0	3	3

SIGNIFCANT FINDINGS

1. All technologies studied, except one require infrastructure to be installed at on both sides of border. The technology that did not require cross-border infrastructure had other disadvantages. Sensing technology must be able to accurately identify the specific truck, and accurately record the geographical location of the vehicle.
2. No one sensor technology was a clear favorite.

LESSONS LEARNED

1. Selected technology will have to (1) identify specific trucks (2) timestamp vehicles they pass in the upstream and downstream direction (3) collect and process travel time (4) achieve data for further analysis and use by agency and stakeholders.
2. Follow-on studies should include current homeland security concepts.

INSTITUTIONAL ISSUES

1. Installation entails cross-border agreements as well as the expense to install technology on both sides of the border. Issue as to how the U.S. would purchase and install equipment located across the border, although it has been done before.

OPERATIONAL ISSUES

1. Location of sensor and operational coordination between agencies.

ARTICLE SUMMARY / SYNOPSIS

Main Objective of the study was to assess the potential of certain technologies to determine commercial vehicle travel time at border crossings by automated means. Collected truck travel times and calculated delay. Review of assumptions in deploying an automated system. Looked at the feasibility of replacing or supplementing data collectors within the system.

Statewide ITS Architecture Development, A Case Study - Arizona's Rural Statewide ITS Architecture
September 1999

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	0	0	4	2	0

SIGNIFCANT FINDINGS

None

LESSONS LEARNED

1. Diverse group of advocates helped assure that user needs were correctly identified.
2. Maintaining coalition momentum was difficult during complex /abstract task of mapping user needs to user services, market and equipment packages. Mapping user needs to National ITS architecture maybe a more expeditious approach.
3. Potential benefits of enhanced stakeholder participation can help justify the costs of procurement.

INSTITUTIONAL ISSUES

None

OPERATIONAL ISSUES

None

ARTICLE SUMMARY / SYNOPSIS

ADOT developed a Strategic Plan for Statewide Deployment of Intelligent Transportation Systems (ITS). The Case Study highlights: (1) using the National Architecture saved time and money, (2) the use of ADOT Community Relations Office assisted by soliciting input from large and diverse group of stakeholders. (3) incorporated input from non-traditional stakeholders such the National Park Service, the National Weather Service and railroad agencies. (4) how lessons learned in prior state ITS developments served as the framework to the statewide effort.

Port-Of-Entry
Marketing Winter Vegetables from Mexico
April 1998

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
1	0	3	1	4	4

SIGNIFCANT FINDINGS

1. The winter vegetables have always accounted for the bulk of the agricultural trade through Nogales during the October-June season.
2. Vegetables for export are produced under contract with distributors in Nogales, Arizona. Producers grow, harvest, and pack the vegetables and then deliver them to the distribution in Nogales.
3. Most of the product travels by temperature-controlled trucks, a small portion by rail, and are loaded at the packinghouses and arrive in Nogales, Mexico the next morning after the 12-18 hour trip.
4. As soon as the truck leaves the packinghouse, information is sent electronically to Nogales to the Customs brokers and the distributors who begin selling the product, often before it has actually arrived. After clearing Mexican and U.S. customs, the trucks deliver their loads to Nogales, Arizona distributors and most of them return to Mexico.
5. The Mexican growers' organization for the state of Sinaloa, Confederacion de Associaciones Agricolas del Estado de Sinaloa (CAADES), has a section dedicated to supporting the vegetable export industry--the Commission for the Investigation and Defense of Vegetables, which is active in facilitating the export process.
6. Each truck uses both a Mexican and U.S. customs broker to clear customs. A truck must clear Mexican customs and present the export document for record and pay a user's fee. The truck then must clear U.S. Customs. All paperwork has been sent electronically to Customs, USFDA, USDA and the Arizona Department of Motor Vehicles. When the truck arrives the decision has been made on whether to require further inspection.

LESSONS LEARNED

None

INSTITUTIONAL ISSUES

None

OPERATIONAL ISSUES

None

ARTICLE SUMMARY / SYNOPSIS

The US Department of Agriculture supplied this report to discuss how winter vegetables from Mexico are marketed to the United States. This study relies mainly on interviews with a limited number of distributors in Nogales, Arizona, producers in Sinaloa and industry organizations. It also discusses how produce is shipped to Nogales and describes the border crossing process.

Port-of-Entry Advanced Sorting System (PASS) Operational Test - Final Report
December 1998

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
4	0	0	3	2	0

SIGNIFCANT FINDINGS

1. A secondary objective of the project was to test the use of "double threshold" WIM scales as an economical method for improving WIM accuracy.
2. Within the scope of this demonstration, benefits included:
   - Improved weigh station personnel productivity and increased enforcement revenues
   - An automatic and continuous check on weights, licenses, registrations, permits, safety and tax payments
   - Significant time and operating expense savings for legally operating motor carriers who are pre-cleared
   - Decline in large truck queues, thereby improving weigh station safety
   - Elimination of confusing variable message signs and complex signal timing on the main line
   - Focusing of static weight enforcement and safety inspections on trucks most likely to be in violation of weight or operation regulations
   - Discouraging unlawfully operating carriers through increased enforcement and time delays, thereby achieving a higher degree of truck compliance and highway safety
   - Acquiring continuous traffic volume, classifications, and weight data for highway planning and maintenance

LESSONS LEARNED

None

INSTITUTIONAL ISSUES

None

OPERATIONAL ISSUES

1. The conventional mainline sorting system worked well, but there were problems with the variable message signs used to direct the vehicles.
2. The problems were:
   - Truckers still misread signs
   - The signs also tended to confuse passenger car drivers
   - Signs require program modifications and are a constant maintenance concern
   - During inclement weather and on heavily traveled or multi-lane highways, variable message signs can prove ineffective
3. A significant issue in mainline sorting is the accuracy of high-speed WIM scales: they are required to allow trucks at legal weight to bypass the static scales and still reliably detect overweigh trucks -- To prevent unnecessary diversion of heavy but legally loaded trucks, WIM accuracy must be improved.

4. The accuracy of a WIM system tends to increase more or less proportionately with the cost of the system. Differing technologies are used by existing WIM systems, each offering a different level of performance at a different level of cost.

ARTICLE SUMMARY / SYNOPSIS

The principle objective of the project was to demonstrate the feasibility of integrating state-of-the-art, AVI, WIM automatic vehicle classification (AVC), and on-board information systems to identify, weigh, classify and direct selected heavy vehicles in advance of weigh stations and Ports-of-Entry.

Assessment of Truck Travel Time & Delay at 7 International Ports-of-Entry - Report Summaries
MEASUREMENT OF COMMERCIAL MOTOR VEHICLE TRAVEL TIME AND DELAY AT U.S. INTERNATIONAL BORDER STATIONS (2001)
HTTP://WWW.OPS.FHWA.DOT.GOV/FREIGHT/PMEASURE/INDEX.HTM

RELEVANCE					
ITS	**CVISN**	**CUSTOMS**	**STATE**	**FEDERAL**	**INTERNATIONAL**
0	0	0	0	3	0

SIGNIFCANT FINDINGS

1. Time needed for processing commercial vehicles entering is significantly longer than departing at every location. Control substance and illegal immigration inspections on Southern border required reviews of incoming cargos and their operators that led to unavoidable time delays.
2. Actual extent of delays encountered in both directions and reasons for them varied by individual port-of-entry.

LESSONS LEARNED

1. Results of the study will help the agency engage with other Federal, State and local jurisdictions in constructive dialog on how they collectively all can improve the security and mobility at the Ports-of-Entry.

INSTITUTIONAL ISSUES

None

OPERATIONAL ISSUES

None

ARTICLE SUMMARY / SYNOPSIS

HAW reviewed the crossing activity to provide a baseline measure of border crossing travel time and delay for commercial vehicles transiting the port-of-entry. This would assist shippers in more consistent predictors of crossing times they may encounter at major locations and identify possible actions that relieve some of the delay now occurring.

APPENDIX C - SURVEY QUESTIONS

SAFETY INFORMATION EXCHANGE NEEDS ASSESSMENT FOR THE NOGALES PORT-OF-ENTRY

Survey/Interview Themes

The *primary purpose* of these interviews is to obtain the perspective of the stakeholders on how operations and safety (including security) might be improved at the Nogales POE via Commercial Vehicle Information Systems and Networks (CVISN) and Intelligent Transportation Systems (ITS) related technologies.

Understand their familiarity with CVISN-ITS/ (Commercial vehicle Operations (CVO) initiatives and educate about these initiatives as appropriate.

1. What is your understanding of CVISN, ITS, CVO and what questions can we answer to provide clarification?
2. What has been your experience with CVISN, ITS, CVO, and other types of systems (discuss as necessary)?
3. What have you learned from these efforts that would benefit Nogales effort in relationship to CVISN/ITS/CVO principles?

Understand the stakeholders operation/business focus and the connection with
Nogales POE, or similar border crossing POE operations

1. Describe your operation or business focus?
2. How is your operation/business affected by the Nogales or a similar border crossing Port of Entry?
3. Within your office/organization, what planned operational improvements will affect the Nogales Port of Entry, or border crossing Ports of Entry in general?
4. How does your office deal with data collection, data storage, and data dissemination?

Historical observations of changes at Nogales POE and any impact to Stakeholder operations.

1. How has the Nogales border crossing POE operations changed over the past 5 – 10 years (administrative, procedural, demographic statistics, technology)?
2. How have these changes impacted your operation/business?
3. What are the current shortcomings at Nogales POE?

What are the key areas of concern as it revolves around operations at the Nogales POE?

1. From your perspective, what should be the major area of focus at the Nogales POE, as it relates to improvements at the port via technology (CVISN, ITS, Safety, Operations, Security, etc.)?
2. Explain.

A. Changes/Enhancements for Nogales Port of Entry

1. What kind of changes or enhancements do you believe are necessary or desired to improve the operations at Nogales POE?
2. How do you think the port would benefit from these changes?
3. How can Intelligent Transportation Systems (ITS) play a role in those changes?
4. What are the trade-offs of these improvements?
5. How important are the trade-offs to your organization?

Given the understanding of what we are trying to accomplish with this survey, what additional concerns/suggestions/recommendations would you like to offer?

APPENDIX D - INTERVIEW SUMMARIES

Arizona Department of Transportation – Motor Vehicle Division (MVD)
George Bays
Coordinator, Special Border Projects

Mr. Bays, being the coordinator of special projects, is well informed and educated on CVISN/ITS initiatives. For this reason, we did not take up his time with the first theme—understanding his familiarity with CVISN/ITS/CVO initiatives.

Understand the stakeholders operations/business focus and the connection with the Nogales POE

The Nogales Port of Entry has a multi-agency focus – there are many agencies working at the Port

ADOT operations –

- Verify Arizona registration (paper trip permits)
- Verify the applicant (Mexican motor carrier or agent)
- Provide proof of insurance and valid commercial driver's license (Mexican federal) and safety compliance
- Personnel are trained to perform motor carrier safety inspections
- Main goal is to continue fostering international trade with Mexico while efficiently moving all goods

Data Collection Tools –

- 60% of all vehicles are processed at the Superbooth (U.S. Customs requirement)
- Weight-In-Motion (WIM) resource is in place
- EPIC2 – AVI, counters, transponders, bar code readers, etc.
- There is certain data we want to extract as well as other agencies needing their specific data
- We should be able to extract only the data that is needed

Historical observations of changes at Nogales POE and any impacts to stakeholder operations

Over the last 5 years, there has been an 8% increase in the number of trucks coming across the border

There are two types of goods coming across – food products and dry freight

Working side by side with Customs has been effective (none of the other border states do this)
Land use is a short coming at the port (there are many hills and valleys that make it difficult to expand and plan)

In regards to technology, there are networks and technologies available, but the questions remains as to how to bring them together to make it all work effectively and efficiently

We (Booz Allen) should look at the whole spectrum – know the port operations, compile a needs assessment and then recommend what will help the port to function better.

What are the key areas of concern as it revolves around operations at the Nogales POE?
Homeland Security is a new issue and a big one that needs to be taken into consideration during this assessment

There is a need for another lane for incoming trucks – maybe an "express" lane to make the system more effective and efficient

How to make the port more trade efficient without compromising safety and security

CDLIS – available, but not using, it needs to be simplified

Arizona Department of Transportation
Dale Buskirk
Director Of Planning

Mr. Buskirk's involvement in projects such as the Nogales Cyber Port and the Arizona Port Efficiency Study (serving as the Project Manger) has allowed for a thorough education and understanding of CVISN/ITS/CVO initiatives. Along with a limited meeting time due to his schedule, we progressed quickly through the interview.

Understand the stakeholders operation/business focus and the connection with the Nogales POE

The number of vehicles has increased, one concern is it is losing market share – the absolute number is growing, but market share is being lost to other regions.

Nogales is a specialized port, with a focus on produce importation. A port with this focus can only grow so much.

80% of winter produce comes through Nogales.

Unless there is a radical change, the ports relatively high position will not be regained.

Sine the Port Efficiency Study, the planning office has established a good working relationship.

Due to the Canamex Corridor, Nogales has been a high priority to the state—a gateway to the corridor.

The port has established a rapport with the community.

The port is more adaptable to changing conditions than most ports – testing new ideas, policies, approaches, and procedures.

What are the key areas of concern as it revolves around operations at the Nogales POE?

There is a challenge during the peak periods when trucks are coming across the border.

Some queues (the length) have to do with Mexican procedures in processing their trucks.

Possible options would be to:

- Do inspections at CAADES facilities on the Mexican side of the border
- Increase the hours of operations of the port during peak periods (instead of building a new lane that will not be utilized during down or slower periods.

Concerns/Suggestions/Recommendations

One means of improving the port is always technology related.

What are some of the "other" technologies for improving the port?

Technology is focused on processes/operations, not on traffic flow.

Arizona Department of Transportation
Traffic Operation Center
Manny Agah
Traffic Operations Center Manager

Mr. Agah's role does not necessitate asking the questions regarding his familiarity with CVISN/ITS/CVO initiatives, since he is very involved in ITS related technologies within the Center and in the interest of time.

Understand the stakeholders operation/business focus and the connection with the Nogales POE

He has no direct role at the port

The Traffic Operations Center provides a role in implementation and deployment of projects

Historical observations of changes at Nogales POE and any impacts to stakeholder operations

Traffic management system improvements (this is the area that needs to most concentrated efforts)

Some changes have been made, but more are needed to make the port more efficient and effective

What are the key areas of concern as it revolves around operations at the Nogales POE?

"There are too many cooks in the kitchen"

Safety and mobility are not as critical as congestion

Since the area is rural, congestions plays more of a role in the operations of keeping the truck running through the compound smoothly. If the port were in an urban area, the issues of safety and mobility would play a larger role.

Security is extremely important since the events of September 11

There are redundant systems

Measurements are not always as accurate as they should be

Changes/enhancements for Nogales POE

Surveillance and control systems need to be updated

There is a need for more staff training at the port in regards to ITS technologies

U.S. Department of Transportation
Federal Motor Carrier Safety Administration (FMCSA)
Alan D. Vitcavage
Federal Program Specialist

Understand the stakeholders operation/business focus and the connection with the Nogales POE

Vehicle inspectors are located on the border

Borders auditors and investigators

Pre-selection of vehicles for inspection

FMCSA is the last agency to get the truck before they leave the compound

They check every license before entering the country – using a PDA

Sometimes the license does not show up as valid – data is not updated on the Mexican side of government

FMSCA will accept faxes to verify validity if this situation occurs

The front line inspectors have a PDA to determine if the carrier should be tagged to be inspected

Data is stored in SafetyNet

DVRS's are uploaded into SafetyNet and then to SAFER

Inspectors have access to Query Central

Historical observations of changes at Nogales POE and any impacts to stakeholder operations

Increased amount of truck traffic

Technology has improved

There is more federal staff in place

FMSCA is now a major player at the Port (for NAFTA to succeed, they must be there)

There is a need for more lanes, more technology and even more staff to make the operations more efficient

What are the key areas of concern as it revolves around operations at the Nogales POE?

The quickest way to get vehicles for FMSCA inspection – it currently can take as long as an hour to get the carriers to their inspection site

Getting correct data from Mexico on the drivers licenses

Changes/enhancements for Nogales POE

Mr. Vitcavage feels these responses are provided in his previous responses.

Arizona Department of Environmental Quality
Edna Mendoza
Hazardous Waste Border Coordinator

The Arizona Department of Environmental Quality does not currently have a presence at the Nogales border. However, they are currently in the process of receiving funding from state legislation that would allow for one inspector at the port.

Their presence would be on behalf of the United States Environmental Protection Agency (EPA). Arizona receives funding from EPA for border issues. They also receive funding from EPA's Resource Conservation and Recovery Act (RCRA) for hazardous waste issues.

They have some understanding of the port operations. A hazardous waste manifest comes from U.S. Customs to the EPA and then EPA inputs that information into an electronic data tracking system called HazTracks.

U.S. Customs currently does the inspection for EPA and if there is a problem with the cargo, then a call is placed to Arizona Department of Environmental Quality and an inspector is sent to investigate.

They believe there is a gap in Arizona. U.S. Customs does not do the data transfer electronically; they send EPA hard copies of the manifests.

Their envisioned procedure is to scan manifests from the shipper.

United States Customs Service (USCS)
John O'Reilly
Assistant Port Director

Understand their familiarity with CVISN/ITS/CVO initiatives

They have some knowledge of FAST.

They will soon be starting a fully functional system at Nogales – a $1 million project.

They are currently in implementation stages of a Customs specific application. It will be similar to Buffalo's system. Buffalo is currently testing transponders and Customs will use the same transponder that Buffalo decides to use.

The carriers will receive information via transponders and variable message signs (VMS). The information will be regarding the truck, the tractor and the driver.

This new system will allow for better control of what/who is crossing the border into the United States.

This system will NOT speed up the traffic flow at Nogales. This aspect of the port (traffic flow) cannot be any quicker. There is a very rapid processing time/process in place.

Understand the stakeholders operation/business focus and the connection with the Nogales POE

The trucks come into the United States and go through a quick inspection immediately after crossing (dog-sniffing, human inspection of trucks).

They are either directed to the Superbooths or to the inspection compound. The inspector at the Superbooth reviews their paperwork. The papers are bar-coded for a quick scan of their information.

Historical observations of changes at Nogales POE and any impacts to stakeholder operations

The compound has been completely redesigned and reconfigured.

The compound is now much faster and more efficient.

There are no shortcomings to the port, it serves as a "model port" to other ports of entry across the United States.

Changes/enhancements for Nogales POE

Customs currently has a queuing management system in place that allows an automated means to determine traffic queuing time. This is currently in the passenger vehicle area, they hope to eventually implement in the cargo operations.

Customs is planning to have lights placed in the inspection stations that will allow for better lighting under the commercial vehicles.

Additional Concerns/Suggestions/Recommendations

The obstacles in place for the port are not which technologies to use or to put in place, but the logistics of "putting in" those technologies. The infrastructure of the compound makes it a challenge to put those systems in place.

United States Customs Service (USCS)
Celia DeLaOssa

Understand their familiarity with CVISN/ITS/CVO initiatives

Celia has a primary knowledge of CVISN, in that she knows what its purpose is and how it is being used on the compound.

Her knowledge stems from working with EPIC and NATEP.

Understand the stakeholders operation/business focus and the connection with the Nogales POE

Processing of commercial cargo in an expeditious manner. The primary focus of the operation is safety and security.

There are no planned operational improvements for the Port, but there has been discussion of relocating the passenger processing area to make more room for the commercial processing of trucks.

There is an automated commercial system that allows for the collection of any data within cargo operations. They are not responsible for storage of that data, nor are they responsible for any dissemination.

Historical observations of changes at Nogales POE and any impacts to stakeholder operations

There has been a significant increase in the volume of trucks coming through the compound. In addition, the new superbooths have increased the processing time of the trucks through the compound.

These changes have had a positive impact on the cargo operations, in that they have been able to cope with the increasing number of cargo trucks coming through the compound and been able to maintain a good flow of traffic, in other words, there is not much congestion within the compound, even though there is a higher volume.

The current shortcomings at the Port would include the lack of examination space for cargo trucks as well as the lack of space to examine those trucks carrying hazardous materials and waste.

Key Areas of Concern

The major areas of focus at Nogales in terms of improving the port via technology should include being able to retrieve more information as it relates to the conveyance, the driver and the carrier. This would help to expedite operations at an even faster pace and allow the trucks to leave the compound much quicker if allowable.

Changes/Enhancements For Nogales Port-Of-Entry

Would like to see a facility expansion—more room is needed for the increase in cargo volume.

This would lead to more space for examination (a larger dock area) of cargo. This would benefit the entire port operations.

Additional Concerns/Suggestions/Recommendations

A consensus needs to be put in place with all the different players that are in place at the Nogales port. Everyone needs to get together to define the objectives of the port and note who is doing what activity, how they are carrying out those activities, and what is their primary focus. The port currently has too much overlapping of processes and procedures.

United States Customs Service (USCS)
Teen Klump
Assistant Port Director (Trade)

Understand their familiarity with CVISN/ITS/CVO initiatives

Very little understanding of CVSIN/ITS/CVO—is attending meetings to learn more about new technologies that may be used at the port.

Has learned that these efforts would benefit Nogales by tracking truck conveyances.

Understand the stakeholders operation/business focus and the connection with the Nogales POE

Teen is the Assistant Port Director in charge of trade and is charged with overseeing all customs issues surrounding importation into the United States.

Their operation is largely affected by the Nogales port of entry.

They are in transition to a new system, ACE. It will track data that has been gathered and will do it by creating accounts for each importer, exporter, manufacturer, carrier, etc. This data is currently tracked on a per transaction basis without any categorical accounting system.

A new system is being considered involving transponders (working with DOT) to track carriers. The exact process to be used is still unknown.

Historical observations of changes at Nogales POE and any impacts to stakeholder operations

There has been a large amount of new technology come into the compound in the last 5—6 years, most of it coming in on the inspection side of the operations.

There has been a noticeable increase in passenger and commercial traffic.

There has been an increase in security measures at the port.

They have impacted Teen's operations by creating more work, there is more need to keep traffic moving—facilitating traffic throughout the port (keep trade moving).

September 11 has created big changes as well. Their main focus once was narcotics intervention, now they are more focused on anti-terrorism.

There is a need to continually train staff on using the new technologies that are being implemented.

There has been an increase in traffic creating long queues—there has been a 20% increase in traffic from the previous year.

They want to find ways to expedite traffic without bringing each truck into the compound.

What are the key areas of concern as it revolves around operations at the Nogales POE?

The main concern is to have all staff that takes part in the port operations to utilize one consistent system (private industry and federal/state government).

This would help to move traffic more effectively and efficiently through the compound.

Changes/Enhancements for Nogales POE

There has been discussion of possibly moving the passenger vehicle lane to another area west of where they are currently located, leaving that part of the port to be expanded upon and be utilized for commercial operations. This would allow for a more efficient expediting of commercial traffic.

Federal Motor Carrier Safety Administration (FMCSA)
Eric Ice
Division Administrator

Mr. Ice demonstrated a thorough understanding of CVISN/ITS/CVO initiatives at our initial meetings. This along with an interest in time allowed us to proceed efficiently through our interview.

Understand the stakeholders operation/business focus and the connection with the Nogales POE

Safety assurance is their top priority, including:

- checking license
- checking driver background

The concern is on the vehicle, including some concern on the cargo. Safety is their main focus.

Historical observations of changes at Nogales POE and any impacts to stakeholder operations

Technology is increasing.

Nogales is much faster at processing trucks than other ports.

The trucks are able to pass through faster than they did 5 years ago

Changes/enhancements for Nogales POE

They want more than an expedited crossing program. FMCSA is mandated to do license checks, safety checks, etc. This has to be included in this system!

FMCSA does not want to re-invent the wheel if there are ways to improve it, then all the better for the port.

Additional Comments/Suggestions/Recommendations

FMCSA would like to find ways to direct vehicles electronically and to direct vehicles prior to entering the port (while in the queue).

Facial recognition and drivers license recognition is also important to running the port in a more effective and efficient manner.

USCS currently has a digital photo of all drivers coming through the port—this could be used when developing the system to verify drivers.

Checking vehicle, carriers and drivers is all that is needed.

Arizona Department of Transportation – Motor Vehicle Division (MVD)
Richard Saspe, Lieutenant

Arizona Department of Public Safety (DPS)
Rob Cahoon, Sergeant

Understand the stakeholders operation/business focus and the connection with the Nogales POE

MVD checks for general compliance, Mexican registration, Mexican federal driver's license, weight compliance

DPS' primary responsibility is to perform safety inspections on drivers and vehicles.

They currently use:

- ASPEN
- PDA's used to check Mexican Federal drivers license
- An electronic report uploaded to ASPEN – con-compliance

Historical observations of changes at Nogales POE and any impacts to stakeholder operations

MVD has seen an increase in the amount of dry freight and produce coming across the border and an improvement on vehicles complying with weight limits.

Sgt. Rob Cahoon believes he is too new to the position to state any trends over the past 5-10 years at the port.

What are the key areas of concern as it revolves around operations at the Nogales POE?

MVD's purpose is to issue permits, but this takes time – a bar code would make the process more efficient.

MVD believes that the WIM devices are not working as often as they should be to have the operations run effectively and efficiently.

DPS believes that inspections can be random and not complete dependent upon the office/agency performing the inspection.

A more efficient system capable of sharing data could alleviate many problems.

Changes/Enhancements for Nogales POE

Both MVD and DPS believe that there needs to be a way to access shared data from a common database as well as getting the data needed that is unique to that specific requesting agency.

Arizona Department of Public Safety (DPS)
Ursula Miller
Highway Patrol, Commercial Vehicle Enforcement

Arizona Department Of Transportation (ADOT)
Dave Phillips
CVISN/PRISM Program Manager

Ms. Miller and Mr. Phillips are both heavily involved in CVISN and PRISM responsibilities within the Arizona Department of Public Safety and the Arizona Department of Transportation, respectively. We did not review their familiarity with CVISN/ITS/CVO initiatives in the interest of time. The focus of their comments lies heavily on the technological aspect of the POE. Their comments are geared toward a more effective and efficient method of operation for the ports future success.

Understand the stakeholders operation/business focus and the connection with the Nogales POE

DPS:

- already has access to SAFER data via ASPEN
- does not need a new data repository specifically for Nogales
- has a good opportunity for ASPEN and SafetyNet in Arizona

ADOT:

- When information is gathered on the vehicles, the concern is that Nogales is not treated as a new information network – the state CVISN system as a whole should be the only system used for the port
- Arizona is a PrePass state and transponders are not a part of CVISN

Changes/enhancements for Nogales POE

ADOT:

- An awareness of CVISN and PRISM need to be included in any solution that is recommended for the Port of Nogales as well as background on these two systems

U.S. Department of Agriculture (USDA)

Those in attendance included:

- Manny Trujillo
  Port Director
- Eloy Cortez
  Plant Protection and Quarantine, Operations Office
- Susan Soltelo
  Supervisor
- Jerry Ehni
  Information Technology

Understand their familiarity with CVISN/ITS/CVO initiatives

Is under the impression that EPIC 2 will be designed to take care of the problem of federal agencies being able to interface with each other and share information.

Understand the stakeholders operation/business focus and the connection with the Nogales POE

The Nogales Port of Entry is mainly an agricultural port – 60% of all commodities that come through the port are agricultural products.

Sixty percent (60%) of all agricultural imports that come into the United States come though the Port of Nogales. The remaining percentage is spread out through the remaining ports along the Mexican border (including, Arizona, New Mexico, Texas and California).

USDA has no direct link with any other borders as far as obtaining information

General Border Operations—

- The truck/carrier obtains a broker
- Brokers are electronically linked to US Customs
- USDA is given a days notice of what is coming into US
- There are 10 U.S. customs brokers in Nogales that do the majority of the work with the Mexican carriers
- A "pre-file" is given to USDA that displays entries (carriers) that will show up that day at the port – USDA will then hold or release each carrier
- Once the carriers have entered the US, they are weighed and inspected by customs and then proceed to the "Superbooth" for clearance or additional inspection
- Carrier then goes to USDA to determine what needs to be done with their shipment
- Carrier then goes to US Customs for their release
- Carrier is then allowed to drive off of the compound

USDA Operations–

- Deals only with the broker
- Is not tied into the US Customs' system
- Is a paper-intensive agency

Historical observations of changes at Nogales POE and any impacts to stakeholder operations

Not many physical changes

Small Physical changes

USDA needs to examine commodities

More hands-on work

Need more space at the compound to examine commodities

There has been seven percent (7%) growth in agriculture commodities coming through the border

Growth in the last 2 – 3 years has been static

Peak volume for the port is about 1,200 trucks a day

Low volume is about 30 – 40 trucks a day

Peak period is from around October to June

What are the key areas of concern as it revolves around operations at the Nogales POE?

Pallet x-ray machines

Need to interface with other agencies

With increasing volume of carriers and commodities, data sharing is vital

Bar codes on documentation used by US Customs could be shared by other agencies
Security issues in US Customs makes the process changes more resistant to actually happening

Changes/Enhancements for Nogales POE

The following problems need to be resolved:

- Retrieving data from US Customs
- No electronic way of alerting other ports of specific commodities, truck lines, etc.
- Data is transferred to an electronic database by USDA
- Funding

U.S. Food and Drug Administration (USFDA)
Adrian Garcia
Port Director

Understand their familiarity with CVISN/ITS/CVO initiatives

Minimal exposure to these initiatives, but has some understanding.

Understand the stakeholders operation/business focus and the connection with the Nogales POE

USFDA is linked to ACS – Customs

Brokers transmits data to customs, data includes:

- Manufacturer
- Commodity
- Quantity
- Value

Data is sent to USFDA headquarters and is filtered for the needed data

70% of all shipments are processed electronically

The driver does not know what has been cleared and not cleared

Two types of notifications are sent out to the broker – "FDA Review" and "FDA May Proceed"

A hold can also be placed on a carrier/truck for review in the compound

Looking for chemical contamination, micro-biological contamination, pesticide residue

Historical observations of changes at Nogales POE and any impacts to stakeholder operations

It has taken 8 – 10 years to reach this point of sharing data

Traffic flow has increased

USFDA would like to have the capability to share information

What are the key areas of concern as it revolves around operations at the Nogales POE?

Inspections at the port take anywhere from an hour to an hour and a half (worst case scenario)

Under ideal circumstances, inspections can take place as quickly as 10 – 15 minutes (best case scenario)

USFDA uses OASIS and can share data from all ports

Changes/Enhancements for Nogales POE

Trying to expedite all carriers as efficiently as possible
Would like to be able to track shipments—actually know where the carrier is in relation to the border

USFDA still utilizes actual paperwork, but are in a much better "situation" than other Agencies

USFDA is 90 – 95% paperless

Pacific Brokerage-Nogales, AZ
JB Hanson
Manager

Understand their familiarity with CVISN/ITS/CVO initiatives

Has some knowledge of ITS technologies.

At one point, was the only broker with one carrier that had transponders on all its trucks. The program was efficient once it was underway, but experienced some technical problems.

Understand the stakeholders operation/business focus and the connection with the Nogales POE

The broker received a manifest from the exporter/importer, transmits that manifest to customs, sends payment to customs for clearing carrier and cargo.

The manifests are sent to customs electronically and a hard copy is also sent to their office—they want a hardcopy for their records.

If all the "clearing" work was done in Mexico before the carrier were to cross the border, the entire process would be more efficient.

Historical observations of changes at Nogales POE and any impacts to stakeholder operations

The port has become more efficient and has created a better traffic flow for the trucks that are coming across the border.

The size of the facility, the largest in Arizona, is a shortcoming to the State. There are other borders in the Southwest that are 2-3 times larger (in other states) and have a lower number of trucks traveling across their borders.

What are the key areas of concern as it revolves around operations at the Nogales POE?

Technology should be the major area of concern. All of the agencies that currently have operations at the port should find a way to work together on the same "system."

The size of the facility is another concern. There should be a way to better utilize the space as it relates to moving the trucks through the compound.

Changes/enhancements for Nogales POE

Necessary enhancements include technological improvements.

The ports would benefit from technological enhancements by having more efficient operations.

Expediting the process would allow more trailers to cross the border, in turn, allowing the broker to make more money!

Additional Concerns/Suggestions/Recommendations

Government agencies (at the compound), in general, need to be more efficient.

The USCS is always trying to find ways to improve their operations and systems at the port and other agencies are not.

APPENDIX E - VENDORS AND PRODUCT SHEETS

Vehicle to Roadside Communications/Electronic Data Interface (EDI)

PrePass
North America's Electronic Pre-Clearance Network

About HELP, Inc.
How Do I Enroll?
PrePass Sales Team
Bypass/Safety Requirements
Additional Services
System Map

Home

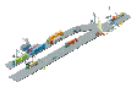
Press Room | Contact Us | Customers | FAQ | Links

About PrePass

What is PrePass?

PrePass is an automatic vehicle identification (AVI) system that allows participating transponder equipped commercial vehicles to bypass designated weigh stations, port-of-entry facilities and agricultural interdiction facilities. Cleared vehicles may proceed at highway speed, eliminating the need to stop. That means greater efficiency for shippers and improved safety for all highway users.

Participating vehicles are pre-certified. Carrier's safety record and credentials are routinely verified with state & federal agencies. PrePass weigh stations employ weigh-in-motion (WIM) scales to electronically weigh the vehicles while AVI antennas verify the identity and compliance of trucks as they approach the weigh station. As a truck passes over the WIM, its axles and gross weight are calculated and the AVI integrates the PrePass transponder verifying state requirements. The AVI antenna also communicates bypass status to the driver. If weight and credentials are satisfactory, a green light and audible signal from the PrePass transponder advise the driver to bypass the weigh station. Otherwise a red light and audible signal advise the driver to pull into the weigh station.



Click here to see how the system works

TELENEXUS

Your Partner in RFID Technology

Vehicular Tracking System (Semi-Active)

This versatile system was developed for Sirit Corporation for gated community applications. It has the best price/performance benefits of any Automatic Vehicle Identification (AVI) system available. Applications have expanded to parking and access control, fast food restaurants, airports, trucking firms, and barrier-based toll facilities.

The reader system can be configured for custom operation by a combination of externally accessible hardware jumpers and menu driven software settings accessed through the dedicated RS-232 maintenance communication port. The reader system is capable of communicating transponder/reader information through a variety of industry standard interfaces, as well as, reporting transponder identification information through RS-232, RS-422, and RS-485 communication connections. Additionally, each of the transponder-reading channels has its own independent Wiegand protocol output.

Highlights:

- Windshield mounted transponder
- Read range up to 50 feet
- Unique security feature that deactivates the transponder once removed from the windshield
- One reader supports up to 4 transponder read points

RFID PRODUCTS

Active RFID System

Toll Collection
Vehicular Tracking

Passive RFID System

Long-range Reader
Cash Card Terminal
Ultra Light Reader
Read/Write Handheld
Long-range Handheld
Handheld w/ GPS Rec

TELENEXUS

Your Partner in RFID Technology

Home

About Us

Services

Products

Our Clients

Contact

RFID Products

Active and Semi-Active RFID Systems

Active RFID Tags are designed to actively transmit data to the reader using the power of a battery attached to the tag. Semi-Active Tags are designed to transmit data by reflecting or backscattering the RF energy back to the reader. There is a battery attached to the tag to keep the electronics of the tag operational.

Passive RFID Systems

Passive RFID tags transmit data to the reader by reflecting or backscattering the RF energy back to the reader. The tag does not require a battery to operate. The size of the tag is limited by the thickness of the chip (integrated circuit) and the antenna (which is often printed on a mylar substrate). The transponder therefore is paper-thin with an area of a credit card or less.

RFID PRODUCTS

Active RFID System

- Toll Collection
- Vehicular Tracking

Passive RFID System

- Long-range Reader
- Cash Card Terminal
- Ultra Light Reader
- Read/Write Handheld
- Long-range Handheld
- Handheld w/ GPS Rec

SmartWatch™ SecureBorders Solutions

U.S. border security has become the focus of scrutiny since the terrorist attacks of September 11, 2001. It is now more important than ever to monitor the entry of foreign nationals into the United States. The problems associated with illegal immigration across U.S. borders are well known. Security must now be enhanced along our international borders without impacting the profitable trade relationship between our neighbors. We must log in, log out, and monitor the movement of foreign nationals within the United States to reduce the threat from external terrorists.

TransCore understands these security requirements and has designed, integrated, and deployed border crossing systems since 1995 to expedite the movement of authorized travelers and freight through entry/exit points, thereby allowing agents to focus on unidentified, high-risk transactions. The SmartWatch™ SecureBorders offerings are part of TransCore's SmartWatch framework of security-focused solutions, featuring the integration of RFID and other advanced technologies to enhance both efficiency and security of ground transportation systems.

THE SENTRI SYSTEM DEPLOYED BY TRANSCORE

Frequent international border commuters can enroll in the Secure Electronic Network for Travelers Rapid Inspection (SENTRI), a system TransCore initially developed for the Immigration and Naturalization Service (INS) to enhance the efficiency of the border crossing process.

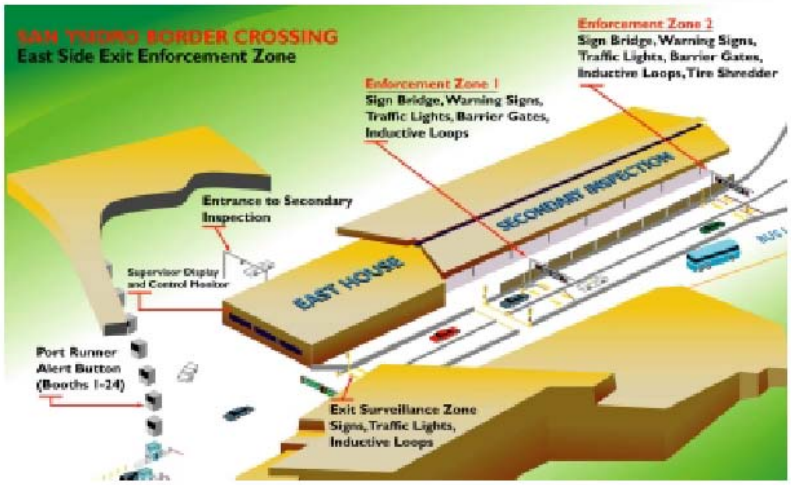
Utilizing sensors based on radio frequency identification (RFID) technology, the system registers frequent international travelers and authorizes them to pass through dedicated commuter lanes at international border crossings. These lanes expedite the movement of low-risk travelers, reduce congestion, and allow reallocation of inspection resources to monitor high-risk travelers.

The SENTRI system is currently installed at the borders of San Ysidro and Otay Mesa, CA and El Paso, TX. The enforcement capabilities and congestion reduction have exceeded all expectations.

There are three key security aspects of the SENTRI system, which is graphically depicted on the following page:

- **Registration and background check** Includes fingerprinting, making photo ID, checking vehicle, and attaching a RFID tag to the vehicle of each trusted traveler

- **Booth security** Includes bollards to keep lanes physically closed, automatic vehicle identification (AVI) sensors for detection and identification, and displays that allow inspectors to view data about the approaching vehicle, its driver, and its passengers



- **Exit Control** Includes signs and traffic lights at Exit Surveillance Zone; barrier gates, signs, and traffic lights at Enforcement Zone 1; and barrier gates, signs, traffic lights, and tire shredders at Enforcement Zone 2 to eliminate the possibility of port runners

A BROADER APPLICATION FOR ENTRY/EXIT SECURITY

TransCore's vision is to create a North American standard for all secure border entry/exit control systems. To that end, TransCore has worked with both public- and private-sector stakeholders as a systems integrator for various secure border projects. For example, at the Ports of Tacoma, Seattle, and Everett, WA and Long Beach, CA, all trade transaction elements (carrier, cargo, container, and driver) are positively identified and monitored through the trade gateways. Also, at the Ports of Long Beach and Los Angeles/Alameda corridor in southern California, freight is moved 20 miles inland to the intermodal freight processing facility. Here electronic seals are used to monitor security and positively identify freight containers associated with a specific train and rail car.

TRANSCORE IS THE RIGHT CHOICE

TransCore provides technology-based services and products that enable its customers to efficiently manage ground transportation systems, assets, and transactions. With a world-class ISO 9001-certified design, development, and manufacturing center and more than 80 patents, TransCore's expertise in providing solutions that improve transportation efficiency and security is unparalleled. For more information on the SecureBorders application, e-mail a request to secureborders@transcore.com. Application profiles on additional SmartWatch security-focused solutions are found at www.transcore.com/smartwatch.

TRANSCORE

For more information call: 1.800.923.4824 or 972.387.8197, or fax 972.733.6486.

www.transcore.com

© 2002 IC IP, Ltd. All rights reserved. TRANSCORE is a registered trademark and SMARTWATCH is a trademark of IC IP, Ltd., and are used under license. All other trademarks listed are the property of their respective owners. Contents subject to change. Printed in the U.S.A. 02-0524a

SmartWatch™ SecurePass Solutions

Facility security is more important than ever. Effective access control systems must be installed to monitor and control the passage of people, vehicles, and freight into and out of critical facilities, such as:

- Military bases
- Nuclear plants
- Oil refineries
- Government facilities
- Chemical plants
- Water resources

It is imperative to find better and more economical ways to identify personnel, protect facilities, and shield critical equipment from external threats or security breaches. Implementing security measures has traditionally been manpower intensive and costly to maintain and staff. TransCore has been successfully designing, integrating, and deploying secure access control systems throughout the United States for more than a decade to automate and improve facility security.

The SmartWatch™ SecurePass solutions are part of TransCore's SmartWatch framework of security-focused offerings, featuring the integration of RFID and other advanced technologies to enhance both efficiency and security of ground transportation systems. The SecurePass system uses proven radio frequency identification (RFID) tags and readers to provide:

- Positive detection and identification of authorized vehicles, drivers, and passengers
- Secure and configurable multi-gate, multi-lane, and flex-lane entrances, gates, and exits
- Accurate screening, immediate identification, and expedited movement of authorized personnel and vehicles through entry and exit points of sensitive facilities

The system permits security officers the ability to automatically separate known (trusted) vehicular traffic from unknown vehicular traffic at entry and exit points of secure facilities. This permits security official to focus resources on unknown traffic potentially reducing labor costs and increasing throughput at secure entry points for trusted vehicular traffic.

BASIC SYSTEM COMPONENTS

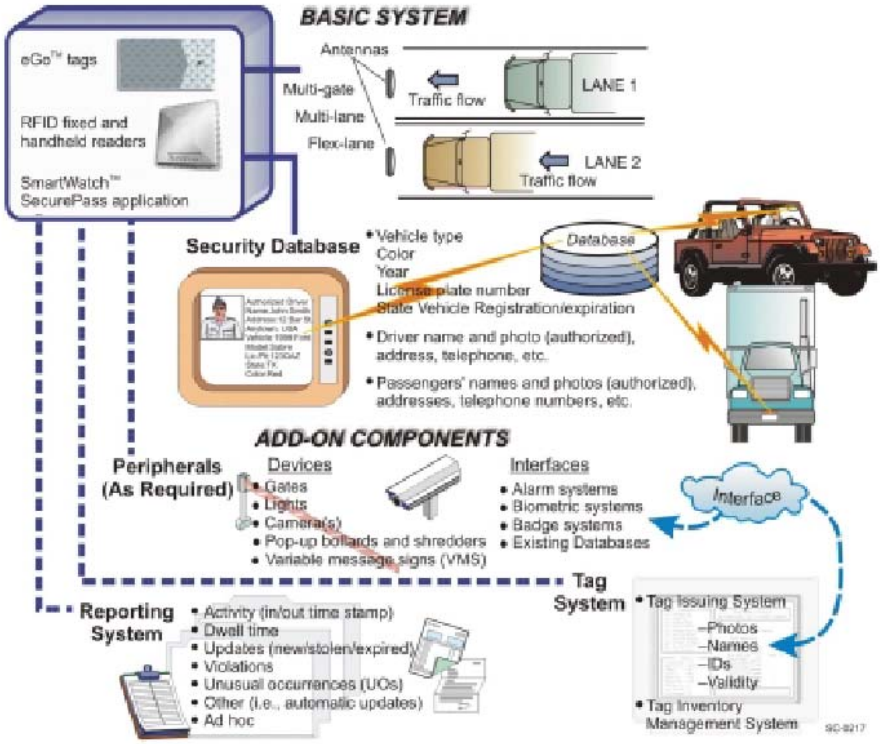
eGo Windshield Sticker Tag

The SecurePass system includes three basic components: tags, readers, and the SecurePass application. The eGo™ tag is a low cost, paper-thin tag (approximately 1.75 in. x 3 in.) that is issued to authorized people and vehicles. This flexible tamper-resistant tag is affixed to the upper portion of the driver's side windshield inside the vehicle.

The readers used in the SecurePass system include both fixed and handheld models. As the vehicle approaches the gate, the tag is read by the reader. The SecurePass system gives the customer the ability to create a database with specific information on authorized vehicles, drivers, and passengers. The reader compares the information embedded in the tag to files in a database. If the information that is stored in the tag matches that in the database, a vehicle is cleared for entry.

SYSTEM OPERATION

Typically, a green light at the entry/exit point signals that the vehicle is cleared for access. A red light signifies that the vehicle is not properly registered or does not have authorized access, and it warrants a closer screening of the vehicle and occupants before access is granted. With the use of SecurePass add-on components, the system can control access to specific areas by remotely opening and closing gates for authorized vehicles. The SecurePass system is designed to operate with multiple peripheral devises including cameras, gates, presence detectors, vehicle retention devices, and interface with existing database, badge system, alarm systems and biometric systems.



Several enhancements can be added to the basic SecurePass system to improve record keeping, increase flexibility, and expand security functionality. These components include a reporting system, which provides critical-use information, such as dwell time, violations, and unusual occurrences; a tag system, which assists with tag issuing tasks and includes a tag inventory management application; and other peripherals, such as interfaces and devices, as illustrated in the diagram below.

TRANSCORE IS THE RIGHT CHOICE

TransCore provides technology-based services and products that enable its customers to efficiently manage ground transportation systems, assets, and transactions. With a world-class ISO 9001-certified design, development, and manufacturing center and more than 80 patents, TransCore's expertise in providing solutions that improve transportation efficiency and security is unparalleled. For more information on the SecurePass application, e-mail a request to securepass@transcore.com. Application profiles on additional SmartWatch security-focused solutions are found at www.transcore.com/smartwatch.

TRANSCORE

For more information call: 1.800.923.4824 or 972.387.8197, or fax 972.733.6486.

www.transcore.com

2002 TC IP, Ltd. All rights reserved. TRANSCORE is a registered trademark and SMARTWATCH and EGO are trademarks of TC IP, Ltd., and are used under license. All other trademarks listed are the property of their respective owners. Contents subject to change. Printed in the U.S.A. 02-0948A

Weigh In Motion

INTERNATIONAL ROAD DYNAMICS INC.
www.irdinc.com

NEW! WINDOWS XP SOFTWARE

WIM MAT MODEL 8000
(WEIGH-IN-MOTION MAT)

We make highways talk™

- *MANAGEMENT*
- *SAFETY*
- *PRESERVATION*

International Road Dynamics Inc. develops and maintains traffic management products and systems technology that make highways talk. What are they saying? They are providing information that roadway administrators need to manage traffic, preserve infrastructure and provide safety warnings to drivers.

IRD's multi-discipline, innovative and customer-focused team is expert in advanced technologies, advanced traffic solutions and custom-designed systems.

CUSTOMER DRIVEN

OVERVIEW

The IRD Weigh-In-Motion MAT (WIM MAT) Model 8000 is a portable weighing system designed for low speed weighing. The WIM MAT system monitors and records truck wheel, axle, and gross vehicle weights, vehicle speeds, and measures the distance between axles. The WIM MAT Model 8000 is a completely portable, lightweight, slow speed and static truck weighing scale that can be transported in the trunk of a car or back of a truck.

ADVANTAGES

Economical	Low cost and quick return on investment
Efficient	Quick set up time (10 minutes)
Robust	Capable of screening hundreds of trucks per day nonstop
Light weight	Each WIM MAT weighing sensor weighs only 11 kg (25 lb)
Screening	Automatically separates overweight vehicles from vehicles within weight regulations
Safe	Low profile weighing pads reduce danger to users
Portable	Entire system can be transported in the trunk of a car or back of a small truck
Versatile Software	Multiple language capability: English, Spanish and Portuguese
	Measure in: Metric, Imperial (lbs & inches) or Imperial (kips and feet)
	Print/save vehicle records for future reference
	Automatic vehicle classification and compliance checking
	Search for vehicle records by: driver id, vehicle id, record number, axle weight and axle spacings

APPLICATIONS

Random spot checks	Use the WIM MAT to enforce various locations to prevent overloading on secondary roads and bypass routes
Mobile weigh station	Use the WIM MAT to enforce areas where permanent weigh stations do not exist
Preliminary weight checks	Private companies can use the WIM MAT to check their truck weights prior to travelling on public highways
Prescreening for weigh stations	Use the WIM MAT to pre-weigh vehicles and direct only suspected violators to report to the weigh station

MAY 2002, REV. B
PRINTED IN CANADA

IRD products and components are protected by one or more U.S. and Canadian patents.
IRD reserves the right to change, modify, or improve its products at any time without notice.

WIM MAT 8000

SYSTEM COMPONENTS

Each WIM MAT system consists of the following components:

- 2 WIM MAT sensors
- 2 rubber cushioning pads (placed under WIM MAT sensors)
- 12 levelling pads (to keep other axles level with weighing axle)
- 1 inverter (to connect to vehicle lighter outlet for power)
- 1 portable computer (processor)
- 2 protective carrying cases for WIM MAT Sensors
- 1 WIM MAT Interface box
- 1 protective carrying case for computer and accessories
- 2 coaxial cables (to link sensors to computer)
- 1 software package (operating system)
- 1 printer with battery

SPECIFICATIONS

ACCURACY

The gross vehicle weight readings will meet the following accuracy, based on one standard deviation:

- Dynamic 3% of verified static GVW up to 10 km/h (6 mph)

Note: The above accuracy specification shall be based on a minimum of 30 runs of a standard test vehicle, in repeat runs over the system. Any vehicle that traverses the scale with more than a 10% speed variation or variable loads (live or liquid) shall not be considered. The accuracies shall only be considered when the site and vehicle conditions, at minimum, meet those identified in ASTM E1318-00. The system shall be calibrated prior to running the vehicle passes.

PROCESSOR

- Laptop computer based

SYSTEM OPERATING TEMPERATURE RANGE

- -25 to 60°C (-13 to 140°F) ambient for sensors
- 0 to 60°C (32 to 140°F) for interface electronics
- 5 to 35°C (41 to 96°F) for laptop and printer

OPERATING SYSTEM

- Microsoft Windows XP

POWER

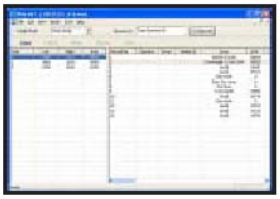
- Battery
- External power: AC mains or DC from vehicle lighter outlet

SYSTEM ACTIVATION

- Manually or automatically (user definable)

SPEED RANGE

- 0 to 10 km/h (0 to 6 mph)



AXLE CAPACITY

- Nominal Weighing Capacity (within stated accuracy range) up to 20 tonnes (44,800 lbs) per axle for tire pressures less than 125 psi

WIM MAT SENSOR DIMENSIONS

- 122 cm long x 44.5 cm wide x 1 cm thick (48 in x 17.5 in x 0.4 in)

WIM MAT SENSOR WEIGHT

- 11 kg (25 lb)

LEVELLING PAD DIMENSIONS

- 91.5 cm long x 61 cm wide x 1.3 cm thick (36 in x 24 in x 0.5 in)

LEVELLING PAD WEIGHT

- 8 kg (17 lb)

CUSHIONING PAD DIMENSIONS

- 114 cm long x 45 cm wide x 0.3 cm thick (45 in x 18 in x 0.1 in)

CUSHIONING PAD WEIGHT

- 2 kg (4.4 lb)

International
Road Dynamics Inc.

Corporate Offices

702-43rd Street East
Saskatoon, Saskatchewan
Canada S7K 3T9
Tel: (306) 653-6600
Fax: (306) 242-5599

#305-1006 West 104th Ave.
Northglenn, Colorado
USA 80234
Tel: (303) 355-5998
Fax: (303) 426-8937

Publicly Traded on the TSE (Symbol IRD)
Find out more about IRD on our website: www.irdinc.com

IRD products and components are protected by one or more U.S. and Canadian patents.
IRD reserves the right to change, modify, or improve its products at any time without notice.

PRINTED IN CANADA

INTERNATIONAL ROAD DYNAMICS INC.
www.irdinc.com

TCC 540 WIM

Portable Weigh-In-Motion Counter/Classifier

NEW!!!

We make highways talk™

- *MANAGEMENT*
- *SAFETY*
- *PRESERVATION*

International Road Dynamics Inc. develops and maintains traffic management products and systems technology that make highways talk. What are they saying? They are providing information that roadway administrators need to manage traffic, preserve infrastructure and provide safety warnings to drivers.

IRD's multi-discipline, innovative and customer-focused team is expert in advanced technologies, advanced traffic solutions and custom-designed systems.

CUSTOMER DRIVEN

FEBRUARY 2003 REV. A
PRINTED IN CANADA

International Road Dynamics Inc. (IRD) is proud to introduce the IRD TCC 540 WIM, a comprehensive unit which combines all of the features of the IRD TCC 540 traffic counter and classifier with the added function of Weigh-in-Motion (WIM).

With the added Weigh-in-Motion feature, the IRD TCC 540 WIM can now provide more in-depth information and data for your traffic planning. Data can be grouped according to classification, speed, time, or weight, depending on your needs.

FEATURES

- Completely portable - Can be used at temporary or permanent sites
- Powered by AC/DC or solar (optional)
- Low cost and lightweight
- Data collection for up to 8 lanes of Piezoelectric WIM
- User-friendly software
- Comprehensive reporting capabilities
- Program and download data via laptop, PC or modem

IRD products and components are protected by one or more U.S. and Canadian patents.
IRD reserves the right to change, modify, or improve its products at any time without notice.

TCC 540 WIM WEIGH-IN-MOTION COUNTER/CLASSIFIER

Specifications

Capabilities:	Count up to 16 lanes, classify up to 8 lanes or weigh up to 8 lanes. Collect vehicle count, classification, gap, headway, speed, length, speed by axle, speed by length, axle weight, and gross weight information.
Counting Modes:	Time Interval - collect and sort data by user-defined time intervals
Classification Modes:	Binning - user definable up to 30 speed, 30 axle, 30 headway and 30 gap bins, speed by axle and speed by length, FHWA Scheme "F" default Individual Vehicle Records (Raw) - time of passage to 1/100 second, speed to 1/100 mph or kph, number of axles and axle spacing for each vehicle stored in memory (Data for approximately 5000 vehicles can be stored in 68K of memory using this mode)
Special Modes:	Time Stamp - sensor activations (accurate to 1/10695 of a second) stored in memory
WIM Modes:	WIM: Individual Vehicle Records (as defined above) plus axle weight and gross vehicle weights WIM + Bin: Binning plus WIM Autocalibration capabilities
Sensor Configurations:	Piezo Piezo Loop Loop Piezo Loop Piezo Loop Piezo Loop Loop Piezo Piezo Loop Piezo Piezo Loop Loop Piezo Loop Piezo
Vehicle Classification:	User definable (customized) and default standard classification schemes
Recording Intervals:	Can have up to 5 different intervals per day with interval lengths from 1 minute to 24 hours
Data Retrieval:	Through telephone modem, IBM compatible computer, or handheld "Datahog" device
Standard Model Configurations:	Multiple combinations of loops, road tubes, DYNAX® sensors and piezoelectric inputs for permanent or portable use
Programming:	From counter keypad and display, IBM compatible computer, or remotely with telephone modem
Telemetry:	Ready with addition of external modem; standard RS-232 port with speeds from 300 to 19,200 baud; cellular option
Units:	User selectable metric or US units
Time & Date:	Multi-year calendar with leap year and Daylight Savings Time adjustment
Sensor Inputs:	4-16 loops (30-500 microhenries), 8 piezoelectric sensors (for WIM or axle count), 8 IRD DYNAX® Sensors
Memory:	1Mb RAM standard with 32 Mb additional on WIM board
Serial Outputs:	2 Serial output ports: Standard control, data transfer Send vehicle record data out
Alarms:	Send alarm output to device - Can program up to 4 WIM alarms which activate the alarm outputs (optional) on the WIM board
Keypad:	16 keys fully sealed and weatherproofed; optional units with no keyboard/display can be programmed and monitored from any IBM-compatible laptop or desktop computer
Display:	Liquid Crystal Display, 4 line by 20 characters, alphanumeric
Temperature Sensing:	Internal temperature sensor, road temperature sensing (optional)
Electronics:	Low power, microprocessor-based, modular construction, plug-in printed circuit boards for easy serviceability
Power:	6 volt, 12-amp hour rechargeable lead acid gel type battery, optional dual battery unit, inadvertent power-off protection to prevent data loss, solar option
Environmental:	0°C to 70°C (+32°F to 158°F), 20 to 90% non-condensing relative humidity
Case:	10 gauge (2.6 mm, 0.102") welded aluminum, ANSI 70 grey powder paint finish, lockable, splashproof enclosure with Military spec connectors
Size:	27 cm x 36 cm x 18 cm (10.75" x 14" x 7")
Weight:	6.8 kg (15 lb)

International Road Dynamics Inc.

Corporate Offices

702-43rd Street East
Saskatoon, Saskatchewan
Canada S7K 3T9
Tel: (306) 653-6600
Fax: (306) 242-5599

#305-1006 West 104th Ave.
Northglenn, Colorado
USA 80234
Tel: (303) 355-5998
Fax: (303) 426-8937

Publicly Traded on the TSX (Symbol IRD)
Find out more about IRD on our website: www.irdinc.com

IRD products and components are protected by one or more U.S. and Canadian patents.
IRD reserves the right to change, modify, or improve its products at any time without notice.

PRINTED IN CANADA

Variable Message Signs

Building Blocks For Any Sign Application

Fully Modular

Two-Line Truck Mount

Glare-Free Visibility

Permanent Road-Side Sign

Wide Variety of Applications

Arrow Dynamic Sign(ADS)

Simplicity of Design

Speed Limit Sign

Versatility and Flexibility

Ramp Queue Sign

Strength and Durability

Truck-Mounted Attenuator

The BRICK®
Modular Message Sign System

Build your message with the one-of-a-kind BRICK®.

For ramp metering, overhead bridges, permanent roadside locations, cantilever signal arms and every kind of vehicle mount, there's nothing more valuable than The BRICK by ADDCO. Its remarkable modular technology and versatility make it the most revolutionary sign product on the market today. The fully modular design of the BRICK accommodates virtually any size of sign across the widest variety of applications. BRICKs can be arranged vertically or horizontally to create any length and width of sign desired in just minutes.

The BRICK features a full-pixel matrix that provides glare-reduced visibility in all lighting conditions. Environmentally sealed to withstand extreme heat, moisture, vibration and shock, BRICKs are vandal-proof and conveniently programmable.

Let us help you design the perfect sign application. Or create your own with our exclusive, easy-to-use sign configuration software, BRICKBuilder™.

ADDCO Traffic Control Group

240 Arlington Avenue East, St. Paul, MN 55117 Phone (651) 488-8600 Fax (651) 558-3600
e-mail: sales@addcoinc.com, website: www.addcoinc.com

SPECIFICATIONS

Required BRICK® Characteristics

Face Material: UV-Inhibited polycarbonate with UV silk-screened mask
Body Material: ABS thermoplastic
Length: 19.25 inches
Width: 13.75 inches
Height: 2 inches
Weight: 4.25 lbs.

The BRICK display module is available in two densities to meet the needs of different applications:

- **High density.** High-density display modules have 96 pixels consisting of 384 LEDs
- **Standard density.** Standard-density display modules have 35 pixels consisting of 140 LEDs

Characteristic	High Density	Standard Density
Pixel arrangement	8x12	5x7
Number of pixels	96	35
LEDs per pixel	4	4
Number of LEDs	384	140
LED spacing in pixel	0.5 inches	1.375 inches
Pixel spacing	1.625 inches	2.750 inches
LED type	592 NM amber	592 NM amber
Minimum character size	10.5 (5x7) 7.0 inches (5x3)	18 inches
Average 24-hour current draw per BRICK	11.5 Amps.	2.5 Amps.
Absolute maximum current draw per BRICK	4.8 Amps.	1.75 Amps.
Typical maximum current draw per BRICK	3.1 Amps.	0.7 Amps.
Nominal voltage	12 Vdc.	12 Vdc.
Minimum voltage	10.5 Vdc.	10.5 Vdc.
Maximum voltage	16.0 Vdc.	16.0 Vdc.

ADDCO Traffic Control Group

Bus Bar for Power and Communications

Material: Aluminum with copper conductors
Length: 240 inches maximum: cut for shorter lengths
Width: 5 inches
Depth: 0.6 inches
Weight: 1.6 lbs. per running foot

Each changeable message sign using the BRICK modular message sign system can consist of one to 60 BRICKs. BRICKs contain rugged LEDs mounted inside an environmentally sealed case. These attach to a modular bus bar that provides power and signal connections. The entire configuration connects electronically to a master controller on the sign. Text and graphics messages are easily created with Windows-based software. Messages can be controlled onsite or remotely. Input devices include PCs, handheld controllers, cellular phones, and radar devices.

The BRICK®
Modular Message Sign System

Contact your ADDCO sales representative today.

Protected by Patent number 5,914,698. Other U.S. and International patents pending.

ADDCO, Inc., 240 Arlington Avenue E., St. Paul, Minnesota 55117 Phone (651) 488-8600, Fax (651) 558-3600 www.addcoinc.com

www.SkylineProducts.com

SKYLINE PRODUCTS, INC.

Traffic Systems

Traffic Systems

Dynamic Message Signs

Changeable Message Signs

LED Technology

Skyline Products, Inc.
2903 Delta Drive
Colorado Springs, CO 80910-1012
Voice: 719.392.9046
800.759.9046
Fax: 719.392.7107
TrafficSystems@SkylineProducts.com

Dynamic Message Signs
LED DISPLAYS

- High intensity amber AlInGaP LED technology provides excellent 24 hour readability
- Superior and extremely efficient ventilations system
- Walk in housing provides safe and easy access
- Lift face housing available
- Low power consumption
- 170 controller is standard
- Full matrix configuration available
- Lift out modules for fast replacement
- Weather tight aluminum construction
- Message selection by predetermined message library and online formatting
- Diagnostic verification of pixel status
- Onscreen message confirmation at central
- All aluminum construction with Kynar coated front face
- Custom sizes and applications are available

Skyline designs and manufactures the highest quality, most technically advanced, user-friendly, reliable and maintenance free LED DMS systems in the industry. In addition, Skyline provides the longest warranty and best on-going customer support. Skyline does all of this at a competitive price.

Skyline is an ISO 9001 certified company, committed to providing the highest quality DMS system available. Skyline is continuously improving its design and manufacturing procedures to ensure that Skyline remains the industry leader.

VULTRON Display Technologies

VMS Technologies and innovations for 37 years. . . We know what we're doing!

● PRODUCT GROUPS
Transit
Highway Signs
R-Tec
Commercial

● PRODUCT COMPONENTS
Reflective Disk
LED
Fiber Optic
LED and Fiber Optic Hybrids
Liquid Crystal Display
Curtain Signs

HIGHWAY SIGNS

Vultron has been providing products to the highway market since 1985. Vultron's walk in cabinet design for overhead VMS signs is superior in the industry, as it allows for internal access to all sign components for ease of maintenance. This design virtually eliminates hazardous working conditions for the maintenance worker servicing the sign, traffic hazards of servicing the sign from the outside, and the need for lane closures.

Through ADDCO Corporation, an exclusive distributor based in Minneapolis, MN, over 2,000 portable trailer signs are in use by transportation departments nationwide. Overhead sign installations are also in place nationwide, as well as in the United Kingdom. The technologies used in these signs include reflective disk, multi and mono color LED, fiber optic and LED-Dot.

For more information on highway signs, contact the Vultron sales department at (248) 853-2200 or **email us** now.

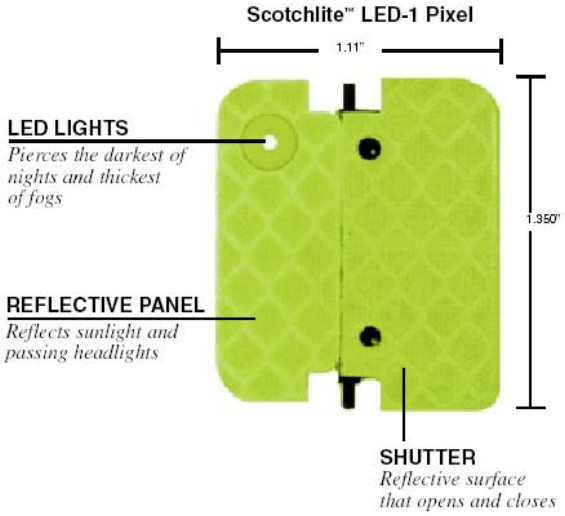
Copyright 2002 © Vultron incorporated

Dynamic Message Systems

Scotchlite™ LED-1 Pixel

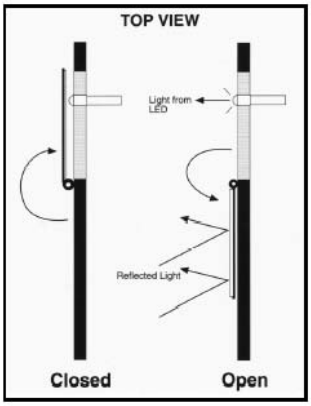
3M™ Scotchlite™ LED-1 Pixel
Pixels with fluorescent reflective* material and high output InGaAlP light emitting diodes (LEDs). The LEDs are embedded in the fluorescent reflective panel for performance 24 hours a day. The reflective panel opens during operation and closes when the pixel is not in use.

Scotchlite™ LED-1 pixels contain a single high output InGaAlP LED providing characters, graphics and safety symbols on dynamic message systems in accordance with MUTCD design and principles.



Features:
- Message signs can be custom configured to meet any specification
- Retroreflective - uses UV stable 3M™ Scotchlite™ Diamond Grade™ Fluorescent Reflective Sheeting
- Ascribes to MUTCD color principles
- InGaAlP LED illumination
- Full matrix capability - can display various sized characters, graphics, arrows, and safety symbols

Display Specifications:
- Pixel color: Fluorescent orange or fluorescent yellow green
- Pixel size: 1.11 inches x 1.350 inches
- Modular design
- Module: 16 pixels wide by 8 pixels high
- Extruded aluminum cabinet
- Non-glare polycarbonate face with UV inhibitor



*Retroreflection occurs when surfaces return a portion of the directed light to its source. This is why retroreflective materials appear brightest to observers located near the light source - a driver and the vehicle headlights, for example. This is true for drivers at almost any viewing angle, which makes retroreflective surfaces excellent for night visibility.

(continued on back)

- Enclosure: Secured National Electrical Manufacturers Association (NEMA) 3R equivalent
- Automatic "fail safe" default message capability-protects agency in the event of a continuous power failure
- Modes of display operations - reflective/LED and reflective only (LEDs are switched and shuttered vs. on 24 hours)
- Pixel color guaranteed not to fade for 10 years
- Efficient power consumption
- Standard interchangeable parts, no special tools required
- Photo cell brightness control
- Multiple levels of illumination
- Pulse width modulation illumination control
- ETL approved

Software Control:

- Windows™ 2000/NT/98/95
- Programmable default message protects the agency in the event of a power failure
- 32 pre-programmed messages
- 125 user messages
- NTCIP compliant

Other Options:

- Local control cabinet
- Notebook PC
- Increased display size allows any type of message
- Remote diagnostics
- Radar speed display
- Cellular
- Radio frequency
- Fiber optics
- Phone line
- CDPD (Cellular Digital Packet Data)
- Contrast shield
- Custom graphical user interface with site map on software

3M

Traffic Control Materials Division
3M Center, Building 225-5S-08
P.O. Box 33225
St. Paul, MN 55133-3225
1-800-553-1380
www.3M.com/tcm

Approved

40% Pre-consumer waste paper
10% Post-consumer waste paper
© 3M 2002 75-0300-9532-9(12.5)i

License Plate Recognition

TDS
TRANSPORT DATA SYSTEMS

LICENSE PLATE RECOGNITION

PLATE REVIEW

PLATE # : KMK86F

STATE: NJ

SAVE RECORD

NEXT IMAGE

PREVIOUS IMAGE

FEATURES

Specialized algorithm rapidly locates license plate.

Character recognition automatically adjusts for variances between plate formats.

Robust analysis compensates for variances in camera positions and lighting levels.

Open systems approach
- Unix operating system
- ODBC compliant database
- TCP/IP
- Currently Red Hat Linux but will port to other Unix platforms (eg HP, Sun, Alpha)

Image Data
- Supports JPEG, TIFF, BMP, PNM formats.
- Recommended JPEG compression ratio 12:1.
- Recommended character height - 12 pixels.

BENEFITS

Major improvements in Violation Processing
- Reduction in manual errors
- Reduced employee fatigue
- Reduced workforce
- Reduced number of workstations
- Equals cost savings

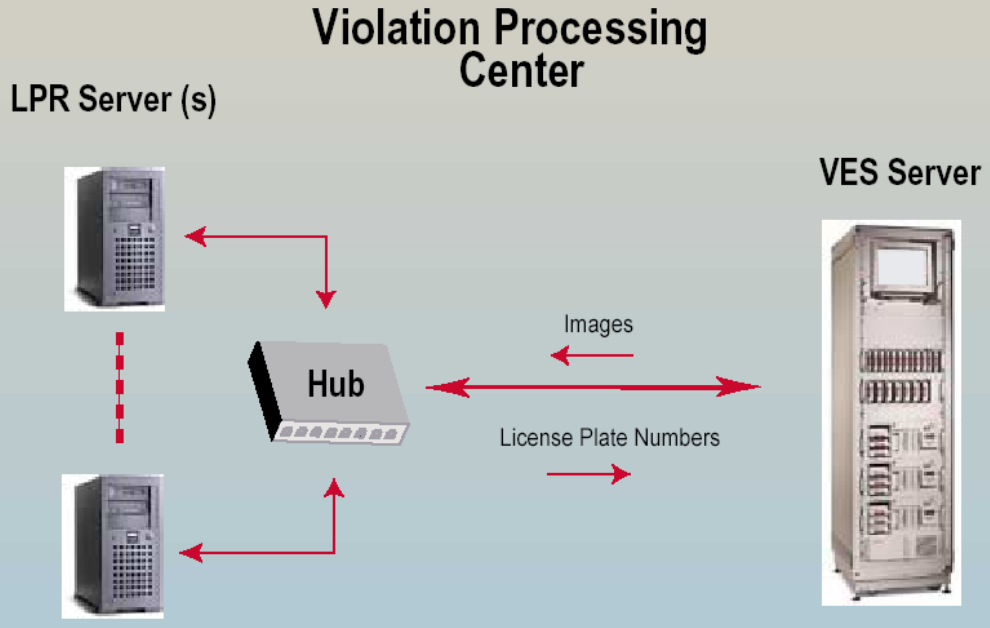
Remote operations via Intranet/Internet allows flexible staffing policies

Integrates seamlessly with TDS violation enforcement systems

APPLICATIONS

Violation Processing Center
Parking Lot Security
Parking Lot Inventory System
License Plate Recognition
Security Access Control for gated communities

LICENSE PLATE RECOGNTION IMPLEMENTATION



The Transport Data Systems License Plate Recognition (LPR) System provides a quick and efficient method for obtaining a machine readable license number from a high resolution image of the front or rear of a vehicle.

The LPR is a standalone application that runs under the Linux operating system.

In a typical operation the LPR server processes the images from a specified input directory, performs the LPR function, and places the resulting ASCII file with the license number in a specified output directory. The flexible design allows performance increases to be achieved through the addition of multiple servers, CPUs, et cetera.

The LPR application can also be used in a real time system to provide license plate numbers for entry into a license plate database. This is useful in situations where the license plates of vehicles entering a parking lot must be immediately available for further processing upon vehicle exit.

The accuracy of the LPR process is directly related to the pixel density of the image and the noise characteristics of the camera. The system works well with the 1.3 megapixel camera system that is provided by TDS as part of its image capture system.

Please contact Transport Data Systems for more information.

TDS
TRANSPORT DATA SYSTEMS
1261C Rosecrans Street
San Diego, CA 92106
Phone/Fax: (619) 226-2534
email: dick@tds-its.com
www.transportdatasystems.com

Automated Terminal Gate Portal and Pedestal OCR Systems

SeeGate is a fully integrated OCR system that automatically reads and records the container ISO code number as the truck passes through a gate complex. The system may also include integrated modules for reading of the truck license plate number, the chassis number and/or the rear plate number.

The system is ideal either as a portal system or for terminal inbound and outbound gate gantries.

SeeGate system is a PC-Based container terminal gate processing system, ideally suited for recognition and recording of container code numbers together with the truck plate numbers, chassis numbers, and others.

The SeeGate system includes proprietary integrated hardware and software systems. The system is based on a proprietary Container Code Recognition (CCR) software engine and utilizes rugged high-resolution camera systems with solid-state LED pulsed illuminators. The system can also be interfaced with the terminal load-lists and manifests for enhanced recognition performance.

SeeGate is designed to share the container/truck/chassis identifications with a central server system. This can be done either by external communication (RS232) or by application-to-application messages. The latter method is implemented by DDE messages that are sent after each identification cycle. One or more Client applications can intercept the DDE messages, for data recording and/or for further processing.

Benefits of SeeGate System:

- Automates data entry of container and chassis number
- Increase Terminal and Traffic Efficiency
- Provides Real-time data Processing
- Enables Security Surveillance
- Enhances terminal assets tracking and management

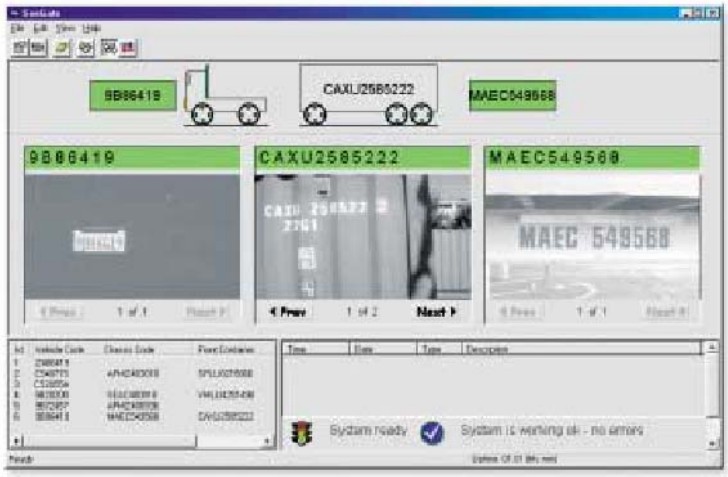
Sample applications: Portal installations, terminal gate systems, border and customs gates

HI-TECH solutions

System Features

- Can Handle all standard size containers (20,40, 45, 20/20)
- Reads ISO 6346 formats including check digit verification
- Reads containers numbers from both sides as well as from rear
- Reads chassis numbers from both sides
- Stores images
- Captures information while truck is in motion
- Simple configurations
- Energy efficient
- Minimal equipment (1 PC per lane)
- Low maintenance
- Superior Reading Accuracy
- Seamless Performance Guarantee

Sample SeeGate Display for Container, Truck Plate and Chassis numbers



HI-TECH solutions

Ramat Gabriel Industrial Park, P.O.Box 133, Migdal HaEmek 10500, Israel
Tel: +972-4-644-0440, **Fax:** +972-4-644-1870, **Email:** info@htsol.com **WebSite:** www.htsol.com

The IBIS License Plate Recognition and Inventory System from ALPHATECH

Improves Customer Service

- *Resolve lost tickets and fee disputes with factual evidence.*
- *LPR assists advanced payment systems (such as pay-on-foot and credit-card-express lanes)*
  - *Absence of human attendant increases the need for evidence to manage lost tickets and fee disputes.*
  - *LPR with advanced payment systems are the next generation of parking control technology.*

Increases Fee Collections

- *Collect full fees for lost tickets.*
- *High-tech evidence quickly resolves and deters fraudulent fee claims.*
- *Tracks gray-listed customers (history of lost tickets, disputed fees or insufficients funds).*

Improves Security

- *Sounds alarm for black-listed customers (history of violence or police alert).*
- *Deters crime in parking facilities*
  - *Deters/helps catch vehicle theft: mismatched ticket alerts staff to take driver ID, etc. (according to your policies).*
  - *Deters/helps catch serial burglary. (Case: LPR identified unique vehicle present during break-ins.)*

Offers Attractive Return on Investment (ROI)

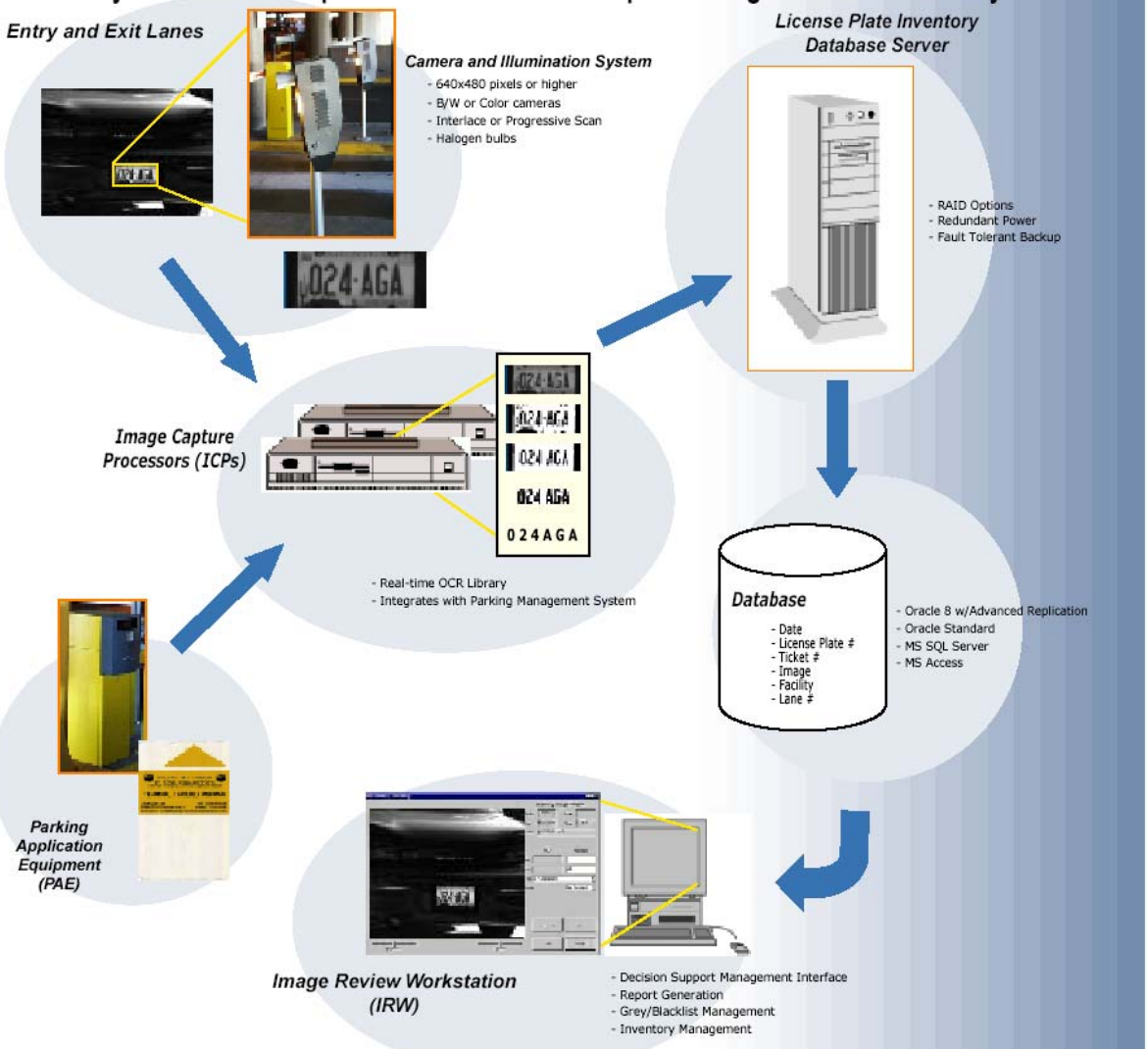
- *Even modest recovery of lost fees can generate high ROI. (Ask for an ROI analysis for your facility.)*
- *If you now use manual LPI: LPR reduces labor costs.*

ALPHATECH Inc
Intelligent Computer Vision Solutions

The Phoenix Sky Harbor International Airport (SHIA) Image Based Inventory System (IBIS) is the first and only fully operational License Plate Recognition System (LPR), nationally and internationally. Based upon ALPHATECH's advanced Optical Character Recognition (OCR) software, the digitized images are matched with the parking ticket information for additional verification. Real-time processing reduces in-lane customer queues.

- See Parking Today, February, 2000 for more information on IBIS.

The IBIS Product from ALPHATECH combines video processing and information systems for a complete solution for license plate recognition and inventory



IBIS performs the following functions

On entry:

- Customer takes ticket; ticket info stored in database.
- Camera captures license plate image.
- OCR extracts license plate number in real-time.
- License plate info stored in database.

On exit:

- Camera captures license plate image.
- Real-time OCR processing of license plate image.
- Ticket info is read and stored in database.
- Check database that ticket and license plate match.
- Remove license plate from active inventory in database.

For More Information Please Contact Us:

ALPHATECH, Inc.
Signal and Image Processing Division
50 Mall Rd.
Burlington MA, 01803

Tel: (781)-273-3388
Fax: (781)-272-9726
email: lpr@alphtech.com
URL: http://www.alphatech.com/lpr/

License Plate Reader

Perceptics is the world leader in License Plate Reader Technology. Current LPR system read Latin (A-Z) and Korean (Hangul) letter and Arabic number (0-9); however, our LPR can be programmed to read any language or symbol in any alphanumeric combination or context on both retro and non-retro reflective plates. With milliseconds the LPR system locates, captures and identifies a vehicle's license plate data and makes a read decision. Our system's reliability and flexibility allow it to accommodate some of the most stringent needs in some of the worst conditions.

Features of our LPR technology include:

- Automatic and within milliseconds
- Reads accurately in most weather conditions
- Reads accurately at highway speeds
- Works 24 hours a day, 7 days a weeks

Applications

Perceptics LPR technology has been used around the world for a variety of applications including:

Security Imaging System Applications:

- International Border Control
- Security and Access Control
- Military Base Security
- Industrial and Nuclear Plant Security

Traffic Management Applications:

- Traffic Violation Enforcement
- Parking Lot Access Control
- Port and Shipping Traffic Management
- Electronic Toll Collection Enforcement

License Plate Reading | Automated Container Identification | Under Vehicle Surveillance | Applications

NORTHROP GRUMMAN
Information Technology

Pellissippi Office Center, Suite 200N
9737 Cogdill Road, Knoxville, Tennessee 37932-3350 USA
Telephone: 865-966-9200 / Facsimile: 865-966-9330
- licenses plate reader, traffic management, access control -

Electronic Cargo Seals

SmartWatch™ SecureFreight Solutions

The need for secure freight management solutions has never been greater. Freight containers crossing U.S. borders from high-risk trade gateways, such as intermodal freight yards, rail yards, and land and sea ports of entry, must be identified and screened for risk, and the following information must be monitored:

- Where was it loaded?
- Who shipped it?
- When was it shipped?
- What should be in it?
- Where is it now?
- Was it sealed?
- Was the seal tampered with? If so, where?
- How, when, where, and by whom was it inspected?

This is critical information that must be gathered, analyzed, and shared with the trade regulatory agents, both in the United States and along our borders.

TransCore has responded to this challenge proactively by creating the SmartWatch™ SecureFreight system, which is part of TransCore's SmartWatch framework of security-focused solutions that feature the integration of radio frequency identification (RFID) and other advanced technologies to enhance both efficiency and security of ground transportation systems.

TransCore's SecureFreight system combines its RFID technology with mechanical seals to create electronic seals (e-seals). These seals provide primary risk screening capabilities to give information about who, what, where, when, and how the freight container was shipped and whether it has been opened or breached illicitly.

TransCore is a leading systems integrator evaluating the performance of e-seals and providing test results to the government, including the U.S. Customs Service (USCS) and the U.S. Department of Agriculture.

INTEGRATING SECURE FREIGHT MANAGEMENT TECHNOLOGY

TransCore has successfully integrated existing public- and private-sector freight-management elements with its systems engineering expertise to develop specialized systems featuring:

- Sensors, based on RFID technology, that provide location (AVI) and container status (e-seals) to monitor the security and movement of trade transactions through trade gateways by positively identifying the vehicle and associated container and monitoring the security status of the container

- The monitoring of freight movement throughout a region via weigh station AVI reports from the Commercial Vehicle Information System and Network (CVISN)

- Electronic reports and trend analyses that identify high- and low-risk participants and provide detailed freight movement information

- A system to monitor the movement of containerized, in-bond freight transactions and electronic closing of in-bond transactions in the USCS Automated Manifest System (AMS) and the carriers' information management systems

- A secure Internet and website (www.transcorridor.com) for interchange of freight management system information between the public- and private-sector stakeholders

SECURE RISK MANAGEMENT

As containerized freight enters the secure freight management system, a methodology must be established to allow containers to be inspected, sealed, preprocessed, and prescreened in a minimum amount of time to avoid long lines at busy trade gateways. An end-to-end secure risk-management system must be implemented that will positively identify people, vehicles, cargo, containers, and the security status of the containers. This system must be automated, effective, user friendly, and low cost. A freight management system must focus on high-risk transactions and provide rapid, efficient screening and processing of the low-risk transactions.

TRANSCORE'S SECURE FREIGHT MANAGEMENT PROJECTS

TransCore has implemented projects that use SmartWatch technologies to monitor the secure movement of trade goods along our highways and across our borders. These deployed and operational freight management systems form the basis for the future SmartWatch pilot projects, which will greatly enhance the security and efficiencies of freight movements throughout North America. These projects include:

Northwest International Trade Corridor

Phase 1 of this project is an operational, chain-of-custody freight management system along the Seattle – Vancouver, BC trade corridor. The system uses a combination of AVI sensors, e-seal sensors, and the Internet to integrate information for the regional public- and private-sector freight-handling stakeholders. The system collects AVI and e-seal sensor detection reports and information regarding the correlation of vehicles with containers, USCS AMS data, and in-bond transactions. The system integrates this data to monitor the movement of containerized in-bond freight out of the ports of Tacoma, WA and Seattle, north along I-5, and through the USCS commercial vehicle-processing facility into Canada. The system then closes in-bond transactions that leave the United States and tracks transaction travel times from port to border.

The freight data collected by the Trade Corridor Operations System Data Center, which serves as the area's service center, is distributed via an Internet-based communications network and website (www.transcorridor.com).

Phase 2 will monitor the movement of containerized, in-bond freight out of Canada, south through the USCS commercial vehicle processing facility, along I-5, and into the ports of Seattle and Tacoma. Phase 2 will also provide the regional Canadian Customs and Revenue Agency (CCRA) access to the Phase 1 and 2 trade-corridor information for their evaluation, potentially expanding use of this data-sharing capability in the future.

Phase 3, in the planning stages now, will encompass the use of biometrics, extending the positive identification of the trade transactions by identifying the driver. This driver ID functionality will also be used for secure entry/exit of vehicles from the ports.

Free and Secure Transport (FAST)

The U.S. Customs Service, teamed with TransCore, deployed and currently operates the FAST (formerly the National Customs Automation Prototype – NCAP) processing system at the Ambassador Bridge, the Detroit-Windsor trade gateway. This program preprocesses select shipments of auto parts coming into the United States. The program detects and identifies specific cargo and vehicles using TransCore's AVI systems. By prescreening and positively identifying trusted auto parts shippers, the movement of freight across the U.S.-Canadian border is expedited, thus allowing fast, secure, safe, and legal shipments.

North American Trade Automation Prototype (NATAP)

This program was the first field operations test of the International Trade Data System run by the U.S., Canadian, and Mexican customs agencies. This International Trade Data System-Automated Customs Environment (ITAS-ACE) will eventually process all international trade in to and out of the country. TransCore was responsible for the original design of the NATAP system. TransCore designed and deployed the NATAP system at the Ambassador Bridge in Detroit and the Peace Bridge in Buffalo, NY.

POTENTIAL SECURE FREIGHT MANAGEMENT SYSTEM PILOT PROJECTS

TransCore continues to work with both public- and private-sector stakeholders to enhance the secure, safe, efficient, and legal movement of goods throughout our borders. Developing projects include:

- **Container security system (Seattle – Vancouver, BC)** As an evolutionary component of the Northwest Trade Corridor, this project will expand the current system to include additional container information, such as security status, travel time, route deviations, positive driver ID, and imports and exports for both the USCS and CCRA.

- **ITS / CVO processing system (Otay Mesa, CA)** TransCore is the systems integrator responsible to design, develop, and deploy a technology demonstration project to integrate the trade, vehicle, and driver processing through customs, immigration, and safety facilities at Otay Mesa. This integrated processing system will accommodate changes in the way freight passes through the Otay Mesa region. The project's objective is the validation of a processing system that will enhance border and freight movement security.

- **Detroit – Buffalo trade corridor** TransCore developed a functional concept for this SmartWatch border trade corridor system, which brings to this region the current benefits of the SecureFreight system deployed in the Northwest Corridor.

- **Pacific Rim international trade corridor** TransCore developed a functional concept and freight management system architecture to integrate the critical freight processing facilities deployed along I-5 from Vancouver, BC to Ensenada, Mexico. The concept is designed to accommodate the secure, efficient, safe, and legal movement of freight from Canada to Mexico on our western border.

TRANSCORE'S CONTRIBUTION TO FREIGHT STANDARDS

TransCore has contributed extensively to such international standards as the American National Standards Institute (ANSI) and International Standard Organization (ISO) standard for freight container RFID as well as the Association of American Railroads (AAR) standard for rail car RFID asset tracking.

TRANSCORE IS THE RIGHT CHOICE

TransCore provides technology-based services and products that enable its customers to efficiently manage ground transportation systems, assets, and transactions. With a world-class ISO 9001-certified design, development, and manufacturing center and more than 80 patents, TransCore's expertise in providing solutions that improve transportation efficiency and security is unparalleled. For more information on the SecureFreight application, e-mail a request to securefreight@transcore.com. Application profiles on additional SmartWatch security-focused solutions are found at www.transcore.com/smartwatch.

TRANSCORE

For more information call: 1.800.923.4824 or 972.387.8197, or fax 972.733.6486.

www.transcore.com

© 2002 TC IP, Ltd. All rights reserved. TRANSCORE is a registered trademark and SMARTWATCH is a trademark of TC IP, Ltd., and are used under license. All other trademarks listed are the property of their respective owners. Contents subject to change. Printed in the U.S.A. 02-0525A

CGM SECURITY SOLUTIONS
(732) 448-1400 tamperguru@cgmsecuritysolutions.com

CONTACT BUTTON MEMORY

CGM, SECURITY SOLUTIONS, INC. presents the Patented Button Memory Seal system, a unique method of maintaining and updating asset information as part of a container or trailer sealing system.

Contact Memory Buttons (CMB) are rugged, battery-free, updateable data storage devices. They exceed MilSpec 810E. They can operate error free for 40 additional years with each touch. Our memory buttons operate for unlimited reads and 1 million write cycles, typically making them outlast the asset they are affixed to.

As compact as the eraser on a pencil, CMB range in size from 5.6mm (shirt button size) to 28.6 mm (around the size of a thumbprint), and can carry as much as 8MB. Each CMB is assigned a non-changeable unique serial number. When attached to an asset or location buttons serve as both an identifier and an updateable logbook for the specific asset (or location). CMB allows an asset to be tracked electronically eliminating time spent on hand data entry and human error.

When applied to a sea container and then to a Navalock MKIIB cable, you have the ability to correlate the seal to the container (box) while allowing the memory button to fill out all necessary documents error free. Ports can use the button to check contents for incoming freight. Buttons help comply with the 24 hour rule as no further time on task is needed to re-write bills of lading data or correlate container contents!

Cost saving in paperwork benefit carriers, ports, shippers and receivers and save far more in labor that the cost of the button and lock combination!

The CMB is a battery free, read/write tool designed for survival in extreme environments including military; aerospace, utility, transportation, and industrial applications. Compact and inconspicuous, CMB is easily attached to your property, and enables you to simply and clearly manage the tracking, inspection, recovery and maintenance of your assets.

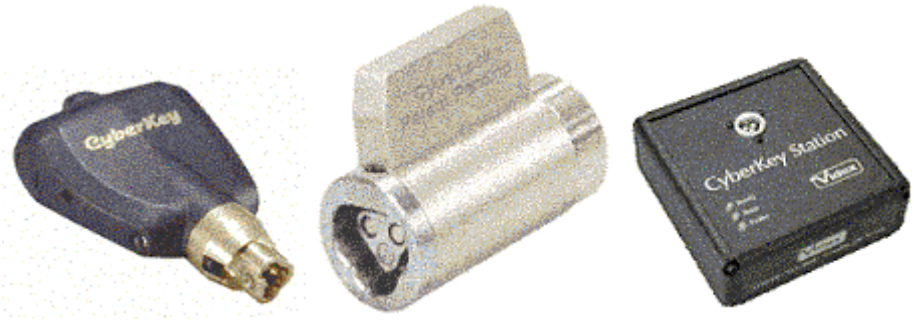
Button Memory is easily read or updated with the ButtonLink, the ButtonLaser, or the Graphic Button Reader. The Buttonlink easily connects to any standard laptop or PC, as well as a range of handheld PDAs. Buttons use NO proprietary software and work in a simple Windows environment. They will operate with any standard PDA. The ButtonLink probe is touched to the CMB and the data is transferred electronically to your PC, PDA or whichever device you prefer. Any device with a USB or Parallel port will support the use of memory buttons. Writing to the button is just as easy, simply update the information and touch the probe to the button again to refresh the data. The ButtonLink can read a 32K CMB in less than 2 seconds with a USB interface, rendering time-consuming hand-written records obsolete.

CMBs can also be read with the ButtonLaser, CGM's own multifunctional, palm-sized portable data collector or the graphic ButtonReader. The ButtonLaser allows you to read/write data to and from the CMB. It also enables buttons and barcodes to be used interchangeably in the same application giving you the flexibility to select the most appropriate identification technology for your needs. ButtonLaser can be programmed with MacSemas easy to use Hierarchy Application Generator or build your own customized applications. The ButtonReader supports CMB applications as well, it is designed for ease of use, allowing you to read/write data, scroll through existing information, and allows for copied data to be easily transferred to your PC.

The Contact MemoryButton technology has been successfully tested using rigorous military standards. ButtonMemory systems are designed to take full advantage of off the shelf software, allowing integration with industry standard hardware platforms. Password protection and data encryption are designed into the system for even more assurance. MemoryButton technology is a significant advance in the way asset data is contained and transported, and offers users the infinite opportunity to improve the quality, accuracy and availability of data.

CGM SECURITY SOLUTIONS
(732) 448-1400 tamperguru@cgmsecuritysolutions.com

CYBER LOCK ELECTRONIC KEY SYSTEM



PRODUCT AND TECHNOLOGY OVERVIEW

CGM Security Solutions now offers the Cyber Lock which is an innovative lock cylinder system that easily converts existing mechanical locks into fully functional, PORTABLE and locking access control systems.

- CyberLock electronic cylinders replace standard mechanical cylinders in both portable and fixed locks such as padlocks and door locks.
- No wiring or battery is required at the lock as the power source is in the key and at docking stations
- The keys cannot be duplicated and they are unique to the user.
- Re-keying is eliminated as a key can be simply reprogrammed therefore losing a key costs you the value of the key rather than the value of a complete system or replacement of all mechanical locks on the system.
- Each key can be variably programmed with a list of the locks it can open, at specific dates and times and if multiple keys are required to open that lock, the Cyber Lock can be programmed with up to 4 keys needed for an opening.
- All keys and lock retain information on who opened them, when and for how long.
  - Keys can be assigned a begin date and an expiration date
  - An audit trail is recorded in both the locks and the keys, which is then uplinked to software through fixed or portable docking stations.
  - One key opens doorways, cabinets, padlocks, cash drawers, and vending machines.
  - They also capture unauthorized attempted openings.

The CyberLock cam lock can also be installed in file cabinets, secured doors and drawers. The 6-pin and IC cylinders install in any padlocks and cabinet locks, and the T-handle cylinders in vending machines, making the system both versatile and user friendly
.
The Cyber Lock is designed for both indoor and outdoor applications. Lock choices and use environments make the technology flexible enough for the harshest settings. The durable Cyber Lock tracks and controls access to outside entrances, gates, computer rooms, padlocked items, cash drawers, jewelry cases, freight trucks, ignitions and vending cash collection routes.

Dual Audit Report
A log of each access event--user ID, date, and time--is stored in both the lock cylinder and the user key, providing a comprehensive history of every use. The cylinder stores the most recent 1100 access events, and the key stores the most recent 1150 events. These access events are transferred to the computer using the CyberKey base station, which connects to the serial port of the PC.

CyberAudit Software--Easy!
CyberAudit software for the PC is your tool for creating your access control system. Manage locks and keys, define user access privileges, create master keys and reset keys, and view a log of audit events from your PC. You can even keep a file of information on each key holder in your system. Program information is sent from the PC to the locks and keys in your system using the CyberKey base station.

Sample Data
High-Security Features
The CyberLock hardware includes many advanced design features to ensure your security. Since there is no keyway in the lock, it cannot be picked like a mechanical lock. The cylinder resists blows and forced rotation, and remains in the locked position if vandalized.

CyberAudit software also provides high-security features. A lock can be set to require more than one authorized key before it will open. A list of blocked keys can be stored in each cylinder for when a key is lost or stolen, eliminating re-keying. A reset key allows you to electronically reset the passwords in your locks and keys if the security of your system is compromised. And, you can define expiration dates for each key for additional key control or to provide temporary access.

The Cyber access Control system requires proprietary software in a standard network. Cyber systems are hard wired for the access control portion. Please call for prices and available designs.

SENTRY SENSOR

The Sentry Sensor is an electronic data logging and door monitoring seal. This sensing system operates covertly within any metal, wood or plastic enclosure. It can be electronically monitored for surreptitious openings of the enclosure from up to 500 yards away. The enclosure can be a sea freight cargo container, rail car, truck body, tote or other specially designed enclosures typically used for containment of cage during transit. Additionally, due to the portability of the system, it may be used for room sweeps, warehouse door monitors, cargo storage cages, electrical switch boxes, manhole covers or any application where entry or exit through a doorway needs to be monitored. The unit can retain up to 250 events in it memory per use and the simple user friendly software operates in a windows environment.

The system gives users the ability to customize the door seal component for each user by programming a unique number into it prior to installation. The seal is activated when the door is shut creating a secure environment for the enclosure as it moves through transit. Once activated, the sensor will monitor, log, and transmit all openings, temperature variations and other default information to a receiving unit.

All loggers, door seals, and receiving units are interchangeable and each individual is battery operated. The logger is programmed to shut down when not receiving a signal from the seal or the inspection device, allowing the battery to operate for up to eight months.

Once the system is activated as a result of an opening, the unit will record the event for later monitoring. Optionally, it will call the user via an internal cell phone to advise you of the event in real time. It can also interface with an onboard GPS unit to report the position of the vehicle upon opening. No data can be changed and no software exists that allows data to be corrupted or falsified.

When the enclosure arrives at its destination and prior to accepting the cargo in good order, the recipient can easily monitor it for openings from the outside of the container. Once the logger is recovered, the historical information can be downloaded and retained for evidence. If the interrogation unit reflects an opening, it responds with the word ALARM. If the unit has been removed from the enclosure the inspection unit shows NO SIGNAL RECEIVED. If the enclosure is unopened and secure the response is NO FAULTS FOUND.

Leghorn Suppliers srl

49, Via G.B. Guarini - 57121 Livorno Tuscany Italy
T. +39 0586 406376 F.+39 0586 407621
www.precintosdesequridad.com info@containerseals.net

Security seals for all Industries and Transports, international forwarding and logistic, Container seals,
Barcode seals, Security seals for ocean carriers, container transports, rail, trucks, trailers

C2K

Records: closure, time elapsed and time since opening

Displays time between one opening and other.
Gives unquestionable answer of tampering.
An ingenious mix of physical security with indicative sealing.

Four digit unpredictable seal number when locked.

Heavy duty padlock.

A high grade Padlock with built in ELECTRONIC Seal.

ELECTRONIC module life of 1000 seal = 3 years.

CORPORATE SECURITY SUPPLY LTD.

891 Century Street, Unit D Winnipeg, MB R3H 0M3
Tel (204)989-1000 Fax (204)989-1010
email: sales@corporatesupply.ca

www.corporatesupply.ca **1-800-563-5566**

Bolt / Cargo Seals

The ABRIC range of barrier seals are high security bolt seals which complies with both the UK and USA customs class 1 requirements for dutiable goods. Barrier seals are widely used in securing cargo containers of sensitive and high value products in the shipping, airline, rail and trucking industries against theft and pilferages.

UnoLock

- The UnoLock can withstand a pull-load of up to 1,000kg
- The pin and barrel comes with matching numbers for greater security control.

Design Features

The inner barrel with serial number inscription is encapsulated in a transparent outer case.

The pin is made of non-rusting steel shaft coated in plastic and the entire plastic enclosure for the barrel and pin is made of hard durable plastic to provide evidence of any attempts of tampering.

The pin and barrel come with matching serial numbers for tighter security control.

Nanoseal

The Miniature Reusable Electronic Security Seal

Benefits: The miniature Reusable Electronic Security seal that records elapsed time between sealing and opening. Increased security with unforeseen random numbers. Time management information which identifies opening and closing

Features: Permanently displays a seal number on easy to read LCD Elapsed time shown in Days/Hours/Minutes Strong nylon beaded security cord is user replaceable. Rugged impact resistance case Reusable 1,000 times Shows last seal number when OPEN and elapsed time since opening

Applications: Courier Bags, Roll cages, Drums, Tote Boxes, Trucks, Hospital Drug Cabinets

THE DATASEAL™ DISTRIBUTION CARGO SECURITY SYSTEM

ENHANCED INVENTORY CONTROL

DEPENDABLE TAMPER PROTECTION

POINT-TO-POINT CARGO TRACEABILITY

TydenTek™

Cargo Security Technology

TydenTek™ protects and monitors your cargo every step of the way.

Today's shipments need more than mere protection. They need rugged, reliable, tamper-proof safeguards, security verification, and information tracking capabilities. TydenTek's new DataSeal Electronic Cargo Security System gives you the protection you can trust.

The DataSeal System includes:

- a built-in electronic seal (two models),
- an outdoor data reader,
- a handy micro seal reader, and
- a hand-held data terminal.

Together, they become a flexible, easy-to-use, cost-effective cargo protection and tracking tool. The DataSeal can be encoded and read only by the owner. Once applied, the DataSeal cannot be replicated or interfered with by outside sources. Once activated, the data is logged and a unique electronic stamp is established for that particular seal. The system allows you to sectionalize a tampering event at any point along your distribution chain, saving significant time and resources if an investigation is necessary.

The DataSeal System uses state-of-the-art RFID and data-encryption technology to provide virtually impenetrable protection. The reusable seal stores event data such as the time and date of a tampering event along a delivery route. This data can then be read remotely (either short or long range) and downloaded to a central computer or field laptop for storage and processing.

A powerful deterrent to theft and tampering, the DataSeal System enhances operational control and data management efficiency. It's easy to set up the system and easy to use. It eliminates the need for complicated and costly visual inspections and manual data registration. It saves shipping and inventory time.

And it provides highly reliable cargo protection and verification you can trust.

Typical Distribution Center/Store/Security System Configuration

- Outbound trailer seal is set by authorized store personnel
- Outdoor reader communicates with trailer-mounted seal as inbound vehicle approaches verifying tamper or set state
- Trailer seal history maintained at internal facility PC
- Master control monitored/updated with overall seal event activity and history
- Detached trailers can be actively monitored for tampering while left unattended at store locations

D³ DataSeal™

- Easily and securely mounted on trailer
- Tamper-proof
- Generates date and time stamp
- Generates a unique seal ID code
- Reusable
- Provides instant, real-time tamper verification
- Long-lasting 3-volt lithium battery
- Splash-proof, high-impact plastic construction
- 1,000-event usage capacity
- 55-event seal memory
- Enhanced seal offers
  - Programmability
  - User-defined memory
  - Dual frequency
  - Long-range reading

DataReader (outdoor version)

- Easy to securely mount on shipping/receiving facility
- High frequency
- Available in country-specific frequencies

Hand-Held Terminal (HHT)

- Provides comprehensive sealing details of every opening and closing
- Provides exact time and duration of each opening and closing event
- Data can easily be downloaded to a central computer or field laptop

MicroReader

- Convenient, easy-to-use, key-fob style
- Provides short-range remote reading up to 2 ft. (60cm)
- Provides instant seal verification
- Reads seal through exterior packaging
- Also available with read-only capability

DEPENDABLE PROTECTION FOR VIRTUALLY ANY APPLICATION.

FOOD DISTRIBUTION

Distributing food and groceries can be a complicated task. Food product safety and integrity needs to be maintained and verified. Pilfering and tampering can be a serious problem. Drivers need to maintain accountability for their time schedules and load security. Rail and truck shipments require billing and invoicing procedures. DataSeal puts an easy-to-use system into place that allows you to protect your shipments, create audit trails of driver activity, and increase inventory control.

CLOTHING AND APPAREL

Designer clothing. Tennis shoes. Valuable furs. Popular trademarked goods. They're all very desirable and very vulnerable targets for thieves. DataSeal allows you to seal trailers at their point of origin and record every opening and closing event along their route. It allows you to verify that the contents you ship are the exact contents that arrive at their point of destination.

ELECTRONICS AND COMPUTERS

The DataSeal system allows you to pinpoint any tampering event along your distribution channel. This can greatly facilitate investigation and insurance procedures in the event of a problem. Although DataSeal is a sophisticated electronic security system, it is also extremely durable and can withstand the rigors of over-the-road transit, harsh weather conditions, rough-handling situations, and more.

LIQUOR AND TOBACCO

Regulated substances such as liquor and tobacco make attractive targets for thieves. Besides pilfering, there are important legal and tax considerations for shippers to deal with. Now you can protect the integrity of each and every truckload, provide for driver accountability, monitor unattended sealed trailers at distribution centers and stores, and streamline inventory tracking with DataSeal.

LESS-THAN-LOAD SHIPPING

Partial loads, combined client loads, multiple delivery points, and insurance risks are complicated challenges for any shipper. DataSeal allows you to increase cargo trackability, streamline shipping procedures, verify trailer contents, monitor transit times between distribution points, and keep tabs on driver timetables to improve productivity. The monitoring capabilities of the DataSeal system also assist your drivers in providing accurate information that quickly identifies the time and place of the tampering event.

THE APPLICATIONS ARE ENDLESS

The DataSeal Electronic Cargo Security System is more cost-effective than conventional non-electronic seals. It can be read manually, provides real-time tampering information, and doesn't require specific tools to apply, remove, and re-apply all along your shipment route. The DataSeal System is available in two versions, both short and dual range. TydenTek can work with you to provide the ideal, easy-to-install electronic system for your specific application. Count on the DataSeal Electronic Cargo Security System for reliable, reportable, reuseable cargo integrity.

Contact TydenTek today for more information: +630-875-0047

Active DataSeal™ 125 kHz IG-SAM-125

IG-SA-125

Physical Characteristics	
Dimensions (in)	1.93 x 1.57 x 0.79
Weight (gr)	90
Power Requirement (volts)	3.6 internal battery
Events Memory	98
Performance Characteristics	
Operating Frequency (kHz)	125
Read Range (in)	23.62 (with HHT); 3.94 (with MicroReader)
Environmental Conditions	
Operating Temperature (°C)	-20 – +70
Storage Temperature (°C)	-20 – +70
Humidity (%)	90 non condensing
Mechanical Vibration	As per MIL-810D & SAE J1455
Mechanical Shock	As per MIL-810D & SAE J1455
Standards	FCC PART 15

Hand-Held Terminal 125 kHz IG-MA-22

Physical Characteristics	
Dimensions (in)	3.94 x 8.27 x 1.77
Weight (gr)	500
Power Requirement	4 x AA size 1.5-volt alkaline batteries
Events Memory	190 @ normal mode; 120 @ extended mode
Performance Characteristics	
Interface	RS-232
Operating Frequency (kHz)	125
Read Range (in)	23.62
Environmental Conditions	
Operating Temperature (°C)	0 – +50
Storage Temperature (°C)	-20 – +70
Humidity (%)	50 non condensing
Mechanical Vibration	Hand carried
Mechanical Shock	Hand carried
Standards	FCC PART 15

Holder (open-face version)

Physical Characteristics	
Dimensions (in)	4 x 2.75 x 1.75
Weight (gr)	30
Environmental Conditions	
Operating Temperature (°C)	-40 – +70
Storage Temperature (°C)	-40 – +70
Humidity (%)	90 non condensing
Mechanical Vibration	As per MIL-810D
Mechanical Shock	As per MIL-810D

D³ DataSeal™ IG-RS-40M-916

IG-RS-40-916

Physical Characteristics	
Dimensions (in)	1.93 x 3.35 x 1.46
Weight (gr)	100
Power Requirement (volts)	3.6 internal battery
User Memory (bytes)	2,048
Events Memory	55
Performance Characteristics	
Operating Frequency (MHz)	916.5
Read Range (ft)	98.4 @ open space
Operating Frequency (kHz)	125
Read Range (in)	19.69
Environmental Conditions	
Operating Temperature (°C)	-40 – +70
Storage Temperature (°C)	-40 – +70
Humidity (%)	90 non condensing
Mechanical Vibration	As per MIL-810D & SAE J1455
Mechanical Shock	As per MIL-810D & SAE J1455
Standards	FCC PART 15
Antenna Characteristics	
Beam Divergence	Omni directional on non-metal wall, hemi-spherical on metal wall
Polarization	Vertical

DataReader (outdoor version) IG-RS-46D-916

Physical Characteristics	
Dimensions (in)	7.68 x 6.5 x 3.74
Weight (gr)	1,000
Power Requirement (volts)	24 Vdc external
Performance Characteristics	
Interface	RS-485 isolated (RS-232 optional)
Operating Frequency (MHz)	916.5 (others available)
Read Range (ft)	98.4 @ open space
Environmental Conditions	
Operating Temperature (°C)	-40 – +70
Storage Temperature (°C)	-40 – +70
Humidity (%)	90 non condensing
Mechanical Vibration	As per MIL-810D
Mechanical Shock	As per MIL-810D
Standards	FCC PART 15.249

Holder (closed-face version)

Physical Characteristics	
Dimensions (in)	5 x 5 x 1.75
Weight (gr)	45
Environmental Conditions	
Operating Temperature (°C)	-40 – +70
Storage Temperature (°C)	-40 – +70
Humidity (%)	90 non condensing
Mechanical Vibration	As per MIL-810D
Mechanical Shock	As per MIL-810D

TydenTek™
Cargo Security Technology

900 Arlington Heights Road
Suite 170
Itasca, IL 60143, USA

Tel. +630-875-0047
Fax +630-875-0048
www.tydentek.com

©2001 TydenTek Printed in USA

THE DATASEAL™ CUSTOMS PROCESSING SECURITY SYSTEM

IMPROVES CARGO SECURITY

ENSURES CARGO TRACEABILITY

SPEEDS CUSTOMS PROCESSING

TydenTek™

Cargo Security Technology

DataSeal™ provides accurate, real-time cargo verification.

Millions of pounds of goods travel across international borders every day. Processing those goods through customs can be complicated and time-consuming.

But it doesn't have to be.

And theft can be a problem all along the way.

But it doesn't have to be.

Now cargo can be protected. Shipments can be easily verified. And the customs process can be streamlined, all with TydenTek's new, rugged, reliable, easy-to-use DataSeal Electronic Cargo Security and Verification System.

The DataSeal System includes:

- a rugged electronic seal (two models),
- an outdoor data reader, and
- a hand-held data terminal.

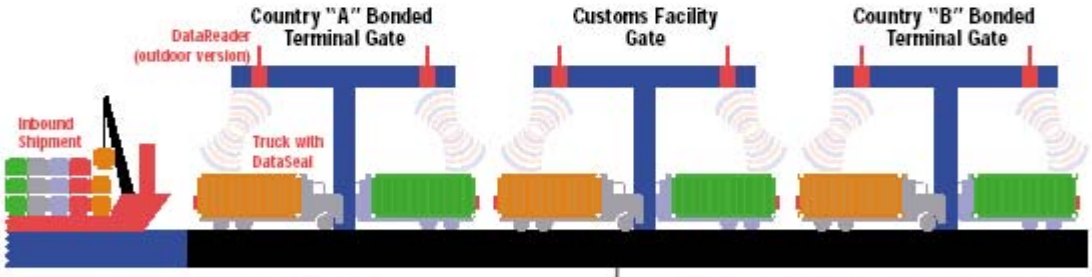
Together, they become a flexible, easy-to-use, cost-effective cargo protection and verification tool. The DataSeal can be encoded and read only by the owner. Once applied, the DataSeal cannot be replicated or interfered with by outside sources. Once activated, the data is logged and a unique electronic stamp is established for that particular seal. The system allows you to sectionalize a tampering event at any point along the customs processing chain, saving significant time and resources if an investigation is necessary.

The DataSeal System uses state-of-the-art RFID and data-encryption technology to provide virtually impenetrable protection. The reusable seal stores event data such as the time and date of a tampering event along the shipping route. This data can then be read remotely (either short or long range) and downloaded to a central computer or field laptop for storage and processing.

The DataSeal System enhances operational control and data management efficiency. It's easy to set up the system and easy to use. It eliminates the need for complicated and costly visual inspections and manual data registration. And it saves shipping, inventory, and customs processing time.

Typical Customs Location Configuration

- Shipment arrives at port
- Goods and containers enter inbound bonded facility
- Container travels to customs inspection
- Cargo is transported from customs to outbound bonded facility



D³ DataSeal™

- Easily and securely mounted on container
- Tamper-proof
- Generates date and time stamp
- Generates a unique seal-ID code
- Reusable
- Provides instant, real-time tamper verification
- Long-lasting 3-volt lithium battery
- Splash-proof, high-impact plastic construction
- 1,000-event usage capacity
- 55-event seal memory
- Enhanced seal offers
  - Programmability
  - User-defined memory
  - Dual frequency
  - Long-range reading

DataReader (outdoor version)

- Easy to securely mount on customs facility
- High frequency
- Available in country-specific frequencies
- Long-range reading

Hand-Held Terminal (HHT)

- Provides comprehensive sealing details of every opening and closing
- Provides exact time and duration of each opening and closing event
- Data can easily be downloaded to a central computer or field laptop
- Short-range reading

DEPENDABLE PROTECTION FOR VIRTUALLY ANY BORDER CROSSING APPLICATION.

CUSTOMS AUTHORITIES

DataSeal lets you instantly and accurately verify the integrity of incoming cargo seal integrity. It quickly gives you information that cargo coming through your facility has not been opened and tampered with. This allows you to dramatically improve the reliability and speed of processing goods through customs, saving time, personnel, and headaches. If there is a tampering event, the DataSeal System allows you to identify at what point along the shipping route an opening/closing event occurred.

BONDED TERMINALS

The DataSeal System provides positive proof that goods were secure while in your possession. This processing data can significantly increase customs through-put, improve your operational productivity, and protect you in the event of a tampering irregularity. DataSeal puts an easy-to-use system into place that allows you to protect the cargo in your possession, create audit trails of driver activity, and increase inventory control.

SHIPPERS, FREIGHT AGENTS, CONTAINER COMPANIES

Time spent in customs is dead time. The DataSeal System lets customs officials know that your containers have not been opened in transit, which can greatly speed customs processing time. DataSeal also provides important protection against theft all along the shipping route, allows you to monitor transit times between distribution points, and allows you to keep tabs on driver timetables to improve productivity.

MANUFACTURERS, POSTAL SERVICES, PACKAGE-DELIVERY SERVICES

DataSeal allows you to seal containers at their point of origin and record every opening and closing event along their route. It allows you to verify that the contents you ship are the exact contents that arrive at their point of destination. This can greatly speed customs processing time and aid in investigation and insurance procedures in the event of a problem. Although DataSeal is a sophisticated electronic security system, it is also extremely durable and can withstand the rigors of transit, weather conditions, rough-handling situations, and more.

PROTECTION YOU CAN TRUST— VERIFICATION YOU CAN COUNT ON

The DataSeal electronic system is more cost-effective than conventional non-electronic seals. It can be read manually, provides real-time tampering information, and doesn't require specific tools to apply, remove, and re-apply all along your shipment route. The DataSeal electronic security system is available in two versions, both short and dual range. TydenTek can work with you to provide the ideal, easy-to-install electronic system for your specific applications.

Contact TydenTek today for more information: +630-875-0047

Active DataSeal™ 125 kHz IG-SA-125

Physical Characteristics	
Dimensions (in)	1.93 x 1.57 x 0.79
Weight (gr)	90
Power Requirement (volts)	3.6 internal battery
Events Memory	98
Performance Characteristics	
Operating Frequency (kHz)	125
Read Range (in)	23.62 (with HHT); 3.94 (with MicroReader)
Environmental Conditions	
Operating Temperature (˚C)	-20 – +70
Storage Temperature (˚C)	-20 – +70
Humidity (%)	90 non condensing
Mechanical Vibration	As per MIL-810D & SAE J1455
Mechanical Shock	As per MIL-810D & SAE J1455
Standards	FCC PART 15

Hand-Held Terminal 125 kHz IG-MA-22

Physical Characteristics	
Dimensions (in)	3.94 x 8.27 x 1.77
Weight (gr)	500
Power Requirement	4 x AA size 1.5-volt alkaline batteries
Events Memory	190 @ normal mode; 120 @ extended mode
Performance Characteristics	
Interface	RS-232
Operating Frequency (kHz)	125
Read Range (in)	23.62
Environmental Conditions	
Operating Temperature (˚C)	0 – +50
Storage Temperature (˚C)	-20 – +70
Humidity (%)	50 non condensing
Mechanical Vibration	Hand carried
Mechanical Shock	Hand carried
Standards	FCC PART 15

Holder (open-face version)

Physical Characteristics	
Dimensions (in)	4 x 2.75 x 1.75
Weight (gr)	30
Environmental Conditions	
Operating Temperature (˚C)	-40 – +70
Storage Temperature (˚C)	-40 – +70
Humidity (%)	90 non condensing
Mechanical Vibration	As per MIL-810D
Mechanical Shock	As per MIL-810D

D³ DataSeal™ IG-RS-40-916

Physical Characteristics	
Dimensions (in)	1.93 x 3.35 x 1.46
Weight (gr)	100
Power Requirement (volts)	3.6 internal battery
User Memory (bytes)	2,048
Events Memory	55
Performance Characteristics	
Operating Frequency (MHz)	916.5
Read Range (ft)	98.4 @ open space
Operating Frequency (kHz)	125
Read Range (in)	19.69
Environmental Conditions	
Operating Temperature (˚C)	-40 – +70
Storage Temperature (˚C)	-40 – +70
Humidity (%)	90 non condensing
Mechanical Vibration	As per MIL-810D & SAE J1455
Mechanical Shock	As per MIL-810D & SAE J1455
Standards	FCC PART 15
Antenna Characteristics	
Beam Divergence	Omni directional on non-metal wall, hemi-spherical on metal wall
Polarization	Vertical

DataReader (outdoor version) IG-RS-46D-916

Physical Characteristics	
Dimensions (in)	7.68 x 6.5 x 3.74
Weight (gr)	1,000
Power Requirement (volts)	24 Vdc external
Performance Characteristics	
Interface	RS-485 isolated (RS-232 optional)
Operating Frequency (MHz)	916.5 (others available)
Read Range (ft)	98.4 @ open space
Environmental Conditions	
Operating Temperature (˚C)	-40 – +70
Storage Temperature (˚C)	-40 – +70
Humidity (%)	90 non condensing
Mechanical Vibration	As per MIL-810D
Mechanical Shock	As per MIL-810D
Standards	FCC PART 15.249

Holder (closed-face version)

Physical Characteristics	
Dimensions (in)	5 x 5 x 1.75
Weight (gr)	45
Environmental Conditions	
Operating Temperature (˚C)	-40 – +70
Storage Temperature (˚C)	-40 – +70
Humidity (%)	90 non condensing
Mechanical Vibration	As per MIL-810D
Mechanical Shock	As per MIL-810D

TydenTek™
Cargo Security Technology

900 Arlington Heights Road
Suite 170
Itasca, IL 60143, USA

Tel. +630-875-0047
Fax +630-875-0048
www.tydentek.com

©2001 TydenTek Printed in USA