

Intermodal Freight Technology

21ST CENTURY OPERATIONS USING 21ST CENTURY TECHNOLOGIES

INTERMODAL FREIGHT TECHNOLOGY CHALLENGES

In recent years, increasing volumes of freight, growing passenger travel, and an increasing emphasis on security have strained the efficiency of freight transportation in many locations, particularly at gateways and along major transportation corridors. Between 1990 and 2003, U.S. international trade with Canada and Mexico, our top two trading partners, has risen by about 91 percent, due in part to the creation of North American Free Trade Agreement (NAFTA) in 1994.

WHY WE'RE CONCERNED

Although efforts have been made to improve the efficiency and reliability of the intermodal freight network, congestion remains a problem. Congestion degrades the reliability and performance of carriers, shippers, and terminal operators—a serious problem for businesses. Predictable travel times are important in an economy where just-in-time delivery and tightly scheduled production and distribution processes are the norm.

The lack of information sharing is also a concern. It leads to operational inefficiencies and heightens concerns about safety and security. Information about the ownership and location of containers and their contents, as freight moves from origin to destination, is crucial to enhancing the security and productivity of the transportation network.

WHAT WE'VE LEARNED

Over the past decade, the volume of intermodal containers moving through ports worldwide doubled. Similarly, the volume of intermodal freight moving by air, rail, and trucks grew just as dramatically. In 2001, an estimated 19 million containers were moved through U.S. water and land ports. Few of these containers are tracked as they are transported to their final destinations. The use of Intelligent Transportation Systems (ITS) and other technologies will play a key role in providing this much needed information and balancing freight transportation productivity with security concerns.

WHAT WE'RE DOING

To improve freight mobility and enhance security, the Federal Highway Administration's (FHWA) Office of Operations is pursuing an aggressive ITS research program. Working with our partners in state and local governments and the private sector, the Office of Operations has initiated several operational tests on the use of the Electronic Supply Chain Manifest (ESCM) system, electronic seals, and asset cargo tracking. The tests have been completed and nearly all the results analyzed.

ESCM was tested at Chicago's O'Hare International Airport and New York City's JFK International Airport service areas. The test used bio-



metric "smart cards" to confirm the identity of truck drivers and to provide cargo movement and access information. The ESCM system reduced the time spent on processing manifests, verifying loads, and validating truck driver identities. The system also enhanced security. Potential savings are shown below.

ESCM Operational Test Results

Per Shipment Savings

Manufacturers	\$1.52
Motor Carriers	\$3.61
Airlines	\$2.72

In a second ITS project, electronic seals were affixed to containers to track cargo from its point of origin to its point of destination between gate-



ways in Canada and the Pacific Northwest. The E-seal is an electronic device that is about the size of a pack of playing cards and weighs a little more than a pound. It uses a radio frequency that emits a signal as it passes reader devices, displaying information about container tampering. The use of this ITS technology in dedicated truck lanes on both sides of the border in the Pacific Northwest can dramatically reduce truck delays by 800,000 hours per year. This reduction in delay can save an estimated \$150 million annually in truck operating costs, including fuel, driver wages, and maintenance.

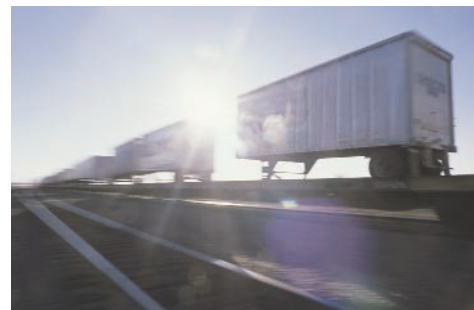
The Asset Cargo Tracking project was designed to 1) improve visibility and productivity via the monitoring of transport assets and cargo during movement between freight terminals and customers and 2) provide asset and cargo information in a standard format to a variety of users. The prototype electronic tracking system collects data on cargo location, status, and time-stamped information via sensors affixed to transport assets. The tracking system can reduce costs through improved efficiencies in chassis and container utilization and enhanced recognition of potential security and routing issues. These benefits are estimated to save \$225 million annually.

A simulation model, called Border Wizard, was developed to identify infrastructure and operational needs at border crossings. It lets users identify and test possible infrastructure, operating, and staffing improvements by simulating cross-border movement of automobiles, buses, trucks, and pedestrians. Developed cooperatively with the General Services Administration (GSA), U.S. Customs, and other federal inspection agencies, Border Wizard has been deployed at 57 U.S. ports of entry. Border Wizard will eventually be linked to traffic simulation tools to provide corridor-planning capability in



the border region. The GSA has mandated its use as a budgetary tool, and U.S. Department of Transportation is now evaluating Border Wizard as a transportation-planning tool. Canada is installing Border Wizard at the Detroit-Windsor crossing, and Mexico has expressed interest in using the model.

Growth in trade, changes in business practices, and concerns about security have also underscored the need for government and industry partnerships to standardize information exchange and implement best practices throughout the global supply chain network. FHWA is working with international organizations to develop electronic freight data exchange standards to streamline cargo transactions, thus improving mobility and security, reducing costs, and relieving congestion.



FUTURE DIRECTIONS

As FHWA continues its activities in support of improving global connectivity and enhancing freight security, we will focus on several areas:

- Evaluate the costs and benefits of leveraging ITS technology in the intermodal freight arena
- Explore opportunities to deploy freight ITS technology best practices as identified in the operational tests through industry and government champions, along with expanded freight stakeholder networks
- Conduct research, testing, and evaluation of new and emerging technologies to facilitate the intermodal movements of goods
- Work with Federal inspection agencies to improve freight mobility and security at gateways
- Work cooperatively with our international partners and lead in the development of freight data standards to facilitate the movement of freight