

# Integrating E-Manifest with Public Sector Reporting Center for Enhanced Security

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**Abstract** – *An automated information-processing and communication system that analyzes electronic data and automatically sends event messages and alerts could be used to enhance homeland security through integration with the new Automated Commercial Environment (ACE) Truck Manifest Program now being deployed by the U.S. Bureau of Customs and Border Patrol. E-Manifests, which will be mandatory at all land border ports of entry by the end of 2007, will be filed by EDI or the web-based ACE Secure Data Portal. High-level analysis of safety and security risks detected in the e-Manifest data would be provided by the proposed system, which is an integral part of the Public Sector Reporting Center concept developed to prevent commercial vehicles carrying hazardous materials from being used in terrorist attacks. Data patterns are detected and compared with programmed values in data tables, searching for matches that indicate an emergency or developing incident requiring an immediate response.*

## INTRODUCTION

The U.S. Bureau of Customs and Border Patrol (CBP) has launched the new Automated Commercial Environment (ACE) Truck Manifest System, which requires motor carriers to transmit advance electronic cargo information (e-Manifests) to CBP at least one hour before the arrival of their trucks at U.S. land border ports of entry. At the border, as a truck approaches the primary booth, ACE will be used to retrieve the E-manifest details, which are reviewed by a CBP officer. If trucks are equipped with CBP-approved electronic transponders, ACE will automatically retrieve the data along with matching pre-filed entries or in-bond requests. The new system is meant to enhance border security and expedite legitimate trade.

## E-MANIFESTS BECOME MANDATORY

On Jan. 25, 2007, CBP began the staged phase-in of ACE, making e-Manifests mandatory at ports in Arizona, Washington, and eastern North Dakota. The remaining states and locations in North Dakota have been divided into five groups for ACE implementation. CBP intends to provide 90 days advance notice in the Federal Register to

set launch dates for them. By June 2007, all 99 land border crossings will be ACE ports, and e-Manifests will be mandatory throughout the system by the end of 2007. Carriers will be able to file e-Manifests either through Electronic Data Interchange (EDI) or the Internet, using the web-based ACE Secure Data Portal.

A technology-based Public Sector Reporting Center (PSRC) concept, developed by Spill Center® to enhance communication, response capabilities, and resource deployment for law enforcement and emergency response personnel, could be integrated with ACE electronic data to enhance border security.

PSRC was designed as the central piece of a new architecture that uses existing technologies to create centralized information processing and command and control capabilities. It monitors and analyzes data using open-architecture technology and automated exception-based, rule-engine software to predict when a material in transportation poses a threat. If data patterns associated with increased risk are identified, alerts would be automatically sent to CBP, response agencies, and other registered users.

## BENEFITS OF PSRC-ACE LINK

Agencies and departments responsible for everything from screening and intelligence to interdiction and emergency response could benefit by the integration of PSRC technology with ACE data. The advantages of linking the ACE system with PSRC would be significant. They include the following:

- Provide CBP and emergency response personnel with access to accurate, timely and actionable information to enhance homeland security;
- Reduce vulnerabilities and improve capabilities to prepare, protect, deter, and respond to intentional and unintentional incidents associated with the transportation of hazardous materials;
- Create a standardized approach to data collection and dissemination to the fire, police, emergency

services, and various other law enforcement and security agencies with a need to know.

In operation, the PSRC would provide high-level analysis of safety and security risks in the transportation of hazmat across U.S. land borders by integrating automated exception-based reporting with e-Manifest and other ACE data. PSRC is also capable of integrating a broad range of telematic devices such as satellite and terrestrial tracking equipment, wireless communications, and on-board computers and transponders already installed on many trucks. Physical security devices and sensors as well as RFID-tagged containers could also be linked to the center.

Through PSRC, ACE data would be analyzed using automated, rule-engine software to predict when transported material poses a threat. CBP personnel would receive alerts directing them to high-risk cargo crossing the border, and agencies responding to dangerous cargo would be provided with the necessary public and private response resources automatically. The rule-engine software can be programmed to send customized alerts to agencies and departments responsible for a broad range of activities, including cargo screening at land border ports, intelligence gathering and analysis, as well as interdiction and emergency response.

### CUSTOMIZABLE RULE ENGINE

The exception-based rule engine software was designed initially to continuously monitor data streaming from truck tracking systems and numerous types of security devices to detect data patterns. Easily customized by police, firefighters, fleets, and other users, the software compares data with programmed values in data tables, searching for matches that indicate a developing incident requiring an immediate response. The system can also inventory critical infrastructure and vulnerable targets at the local, state, and federal levels, and generate customized alerts through the alert-notification system when those sites are threatened. Events such as an unauthorized driver in a truck, off-route status, a panic event sent by the driver, or cargo or facility tampering could trigger alerts that are automatically routed to predetermined addresses, including Spill Center, which would serve as the hub in the communications network.

The rule engine could be linked to specialized databases containing e-manifest data, government mapping data; public, private, and for-hire response resources; and other information accessed through a proprietary data structure. Alerts could be sent in the user-specified form of an e-mail, fax, page, text-enabled cell phone message, or voice message. A single event could deliver an unlimited number of customized messages to an unlimited number of organizations with a need to know.

When an alert is delivered, it includes a description of the event, vehicle location, and information on the material involved, driver, shipper, and consignee. Available public and private response resources can also be accessed through a secure web site. An unlimited number of organizations could register to use the PSRC and create custom alerts based on their individual needs. Participants would register via the Internet to create an organization ID, administrative contact, their own event rules, and customized alert notification contact records.

### EXTREMELY FLEXIBLE SYSTEM

The automated software-based rule engine was developed to interface with a broad range of vehicle tracking systems, enabling carriers to benefit from the system's capabilities irrespective of the equipment installed on their vehicles. The PSRC would not only provide better communications and advanced capabilities for CBP and other law enforcement and emergency response agencies, it would also offer increased security for transporters and shippers and improve a fleet operator's ability to respond to accidents and limit costs and liability associated with spills of hazardous materials, diesel fuel, and other regulated materials.

In addition, the system could be configured to meet other safety and security needs of transporters and shippers. The software could be programmed to send messages or alerts whenever matching values are found in the data table, such as when a vehicle reaches a given waypoint at the scheduled time or when matching values indicate an irregular situation, such as when a vehicle is behind schedule for an unexplained reason.

Certain combinations of incoming data might indicate a truck has been hijacked. In one scenario, a truck's on-board computer sends data indicating that the vehicle, carrying a material which is poisonous by inhalation, is speeding on US-71 in Bentonville, Arkansas, in the vicinity of a stadium or a school. This pattern – a speeding truck, containing highly toxic material, in a populated area – identifies a potential threat. The PSRC would generate an alert message to a list of appropriate authorities. Even if the driver is incapacitated, the alert message would be transmitted. No driver input would be required.

### SHARING OF INFORMATION

The PSRC is a data consolidator and draws information from authoritative sources, while enabling users to access a variety of data resources. Specialized resources linked to the PSRC could provide a significant advantage to private and public sector agencies and organizations wishing to exchange data. An Internet-based system using wireless, handheld computers with inventory macros for fire services

and other emergency responders has been developed by Spill Center. It enables participating agencies to share information about the location of assets, personnel, and other resources via a secure website. Response vehicles equipped with tracking devices can be located in real time.

The driver of a hazmat vehicle, for example, would use the handheld, touch-screen device to take an inventory of the supplies and gear on the truck as well as the trained personnel attached to his unit at the end of the shift. He uploads the inventory update to a secure database for 24/7 password-protected access. This system offers the traditional inventory replenishment alert capabilities and, more importantly, enables the hazmat unit to become a vital part of a broad emergency response network. Any authorized user – at the local, county, state or federal level – is able to query the system to find the location of assets needed for a particular incident. That real-time information could prove to be critical in the aftermath of a terrorist attack.

## U.S. DOT OPERATIONAL TEST

The PSRC concept was successfully demonstrated during the U.S. DOT's Field Operational Test (FOT) in 2004. As part of the government's post-Sept. 11, 2001 efforts to increase homeland security, the DOT was tasked with identifying areas within the transportation system that were vulnerable. The transportation of hazardous materials was identified as the greatest security risk within the motor carrier industry since each day in the U.S. there are over 800,000 shipments of hazmat. Those include 300,000 daily movements of materials that pose extreme risks, such as large quantities of flammable liquids and gases into residential and urban areas and other population centers. Commercial vehicles carrying hazmat can be used to start fires and create explosions that can result in mass casualties and destruction of critical infrastructure, including bridges and tunnels, and vulnerable targets such as schools and high-profile events.

The FOT was designed to quantify the security costs and benefits of an operational concept that applies technology and improved enforcement procedures to hazmat transportation. Participants included law enforcement agencies, transportation companies, and technology providers. The FOT was designed to demonstrate an approach that enhances the safety and security of hazmat shipments from origin to destination and to assess safety and security threats involved.

Managed by the Federal Motor Carrier Safety Administration (FMCSA) and largely funded by the U.S. DOT's ITS Program, the FOT, included 100 trucks equipped with a variety of existing technologies that were tested across four different transportation scenarios. Law enforcement agencies in California, Illinois, New York and

Texas field-tested the technologies, intended to enhance their ability to prepare for and respond to threats posed by commercial vehicles carrying hazardous materials. Law enforcement tested many of the same technologies that were evaluated in the entire operational test, including capabilities such as:

- Driver verification using password logins, fingerprint biometrics and smart cards;
- Vehicle and load tracking, using satellites and other wireless systems;
- Off-route and stolen vehicle alerts, using geofencing; and
- Driver distress alerts, using driver panic buttons.

## PSRC CAPABILITIES DEMONSTRATED

The PSRC component was added to the FOT to assess this new information-integration concept and evaluate its ability to enhance communication, response capabilities, and resource deployment for law enforcement personnel. Also evaluated were its abilities to provide high-level analysis of safety and security risks in the transportation of hazardous materials by commercial vehicles. During the course of that phase of the FOT, Spill Center worked in conjunction with team leader Battelle Memorial Institute, the Commercial Vehicle Safety Alliance (CVSA), and QUALCOMM in demonstrating the effectiveness of the PSRC concept.

Alert notifications were related to situations involving unauthorized drivers, off-route conditions and panic-message data received from the trucks. Color-coded red, yellow and green – based on the perceived threat – the alerts were delivered in the individual user's choice of e-mail, fax, page, phone text messages, and voice notification. In the test, the PSRC assimilated various pieces of information from multiple sources, looking for patterns associated with increased risk. Once identified, a variety of real-time communications were employed to provide data-rich and threat-pertinent information to law enforcement personnel in the field.

Spill Center provided the call center infrastructure, web services, and software to support wireless communication between telematic devices and public sector agencies which comprised the PSRC for purposes of the FOT. Spill Center also provided the rule-engine software that allows public sector agencies to write interfaces to the system, enabling users to create customized event messages and alert-notification rules.

## OPERATIONAL TEST FINDINGS

During the FOT, the PSRC was staffed live, 24/7, and was able to incorporate wireless voice/data communications,

satellite-tracking technology, automatic routing of alerts to authorities, and online access to highly specialized data. The results were real-time alerts based on monitoring of hazmat shipment information, increased load security, and enhanced law enforcement actions and incident response in the selected test areas. The PSRC made available the web-based application and allowed end users to create and manage rules specifying which conditions triggered the alert/sent notification messages. The PSRC also managed user contact information including e-mail, cell-phone text messaging, fax, and pager numbers.

The exception-based reporting software as well as database and messaging software produced and delivered alerts based on detection of certain user-specified events. The system accepted information input in the form of data feeds from a number of different sources, namely FOT partners. The information from each partner source was temporarily stored and preprocessed. The data was then aggregated and stored in the data silo (a single relational database), which correlated and stored all the information received from the various data feeds. Once in the data silo, the individual pieces of information were analyzed by the rule engine software according to customized rules. Those rules analyzed the contents of the data silo, finding data patterns or specific criteria defined by users. As those patterns were found and criteria were met, the system sent one or more messages, according to a user-specified distribution list.

## INTEGRATION OF TELEMATIC DEVICES

The use of telematic devices by law enforcement, fire and rescue services, shippers, and transporters, and many other segments of society is widespread. The PSRC concept advances this communications technology to a more open, universal level and will evolve into a ubiquitous resource. It has the ability to integrate output from telematic devices, irrespective of type, manufacturer, or proprietary software, and deliver meaningful information, events messages, and alert notification to users based on what they need and want.

The rule engine software automatically analyzes incoming data, enabling organizations and individuals to focus on what they need to know without having to learn information technologies, computer programming, and proprietary software. Anyone using simple language would be able to specify and identify events that affect them and their organizations. This ability to connect a broad array of telematic devices would become especially important to organizations that protect human health and the environment and those engaged in security and homeland defense.

The integration of real-time data with a system dedicated to the management of emergency response and remediation is a unique and beneficial application to both industry and the public interest. Data ownership and system security will continue to be high priorities for PSRC development. It can

serve as a valuable tool in the government's efforts to increase homeland security against terrorist attacks by improving communications and command and control capabilities of law enforcement and security agencies.

## CONCLUSION

The integration of PSRC technology and electronic data from the new ACE system and other government and private resources would significantly enhance homeland security at U.S. land border crossings and beyond as it relates to trucks carrying hazardous materials. The PSRC concept was designed to create a standardized approach to data collection and dissemination to the police, fire, and other emergency services. In the event of a terrorist attack, it can enhance communication, response capabilities and resource deployment for law enforcement and security agencies.

## ACKNOWLEDGEMENTS

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