

DIVISION HIGHLIGHTS: ADVANCED TRANSPORTATION TECHNOLOGIES

AMASCOT: REDUCING THE PAPER LOAD FOR MOTOR CARRIERS AND STATES

Project Partners: Iowa Department of Transportation; Rockwell International Corporation (Rockwell); Rand McNally-TDM, Inc.; Minnesota Department of Public Safety; Wisconsin Department of Transportation; Western Highway Institute/ATA Foundation; Iowa Motor Truck Association; Minnesota Trucking Association; Wisconsin Motor Carriers Association; Federal Highway Administration; and CTRE

AMASCOT: Background

Commercial motor carriers function under a myriad of regulations and requirements designed to ensure that carriers operate safely and help pay for their use of roadways. Two significant requirements are that motor carriers document and report (1) mileage traveled and (2) fuel used by their fleet. These mileage and fuel data are used to apportion registration fees for each vehicle and fuel taxes for each fleet to the states in which they travel. Complying with each individual state's unique reporting requirements is a costly, inefficient burden for carriers, and administering/enforcing the requirements is no less a headache for regulatory agencies.

To help alleviate these regulatory burdens, several jurisdictions formed the International Registration Plan (IRP) and the International Fuel Tax Agreement (IFTA) to simplify the apportionment of registration fees and fuel taxes, respectively. IRP and IFTA allow motor carriers to report mileage and fuel use for all member jurisdictions on a single report to a single jurisdiction (known as a base jurisdiction).

IFTA and IRP greatly simplified the reporting process for registration fee and fuel tax apportionment, but the motor carriers' burden of compiling and tabulating vehicle mileage and fuel use data for this reporting remained. In addition, because participation in IFTA and IRP was voluntary, not all jurisdictions were members, and motor carriers still had to report mileage and fuel use data to each nonmember jurisdiction in which their vehicles traveled.

Fortunately, Title IV of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA-91) took a giant step toward alleviating these burdens by requiring all states to join IFTA and IRP by September 30, 1996. While complete jurisdictional participation in IFTA and IRP eliminates the issues and costs associated with meeting the reporting requirements of multiple jurisdictions, motor carriers still have the burden of collecting and maintaining the necessary vehicle mileage and fuel use data to support this reporting.

Additionally, reporting data to the base jurisdictions is an inefficient paper process, with the motor carrier compiling the data, often transferring them from paper to computer records for their own uses, and then filing them in the correct paper format to the states. States then enter the data on their own computer systems. Motor carriers are required to keep records of these filings and the supporting data for three years, thus continuing the burden of the inefficient paper process. Clearly, an improved method of collecting, reporting, and archiving motor carrier

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mileage and fuel use data that eliminates many of the manual and paper processes could alleviate much of the burden related to these regulatory requirements.

CTRE recognized that the standardization of these reporting requirements mandated by ISTEA-91 cleared the way for automating data collection and filing processes. Such automation would further simplify both carrier compliance with, and state administration of, the IFTA and IRP reporting requirements.

Together with its project partners, CTRE developed the Automated Mileage and Stateline Crossing Operational Test (AMASCOT) to test and evaluate an innovative application of technology to electronically collect and report mileage and fuel use data for registration fee and fuel use tax apportionment. The project was funded as a Federal Highway Administration (FHWA) Intelligent Transportation Systems (ITS) Field Operational Test (FOT) project from January 1994 through March 1996. CTRE managed the project, compiled the sample data and prepared sample reports, and led the evaluation effort. **end**

AMASCOT: CTRE teams with Iowa, Minnesota, and Wisconsin

Motor carriers pay registration fees and fuel taxes to each jurisdiction based on the mileage traveled in that state by all vehicles in their fleets. In most cases, drivers manually record fuel purchases and mileage traveled, a process that is time consuming and subject to error. Using these data, individual vehicle records must be compiled by the carrier,

and IFTA and IRP reports generated and forwarded to the base jurisdiction.

In the interest of streamlining these processes, AMASCOT demonstrated and evaluated technology that electronically collects motor carrier mileage and fuel-purchase data. AMASCOT also tested the feasibility of electronically filing the required reports for commercial vehicle operations (CVO) fuel tax and registration apportionment with the appropriate base state. The goal of the test was specifically to determine the feasibility of using an electronic collection/reporting system that would meet IFTA and IRP requirements.

To accomplish this goal, the AMASCOT partners pursued the following objectives:

- Develop procedures and software to electronically collect data and submit reports to base states.
- Ensure the system accommodates state auditing guidelines and IFTA/IRP reporting requirements.
- Test and evaluate the technology.
- Analyze user acceptance and benefits/costs to motor carriers and states.

System description

The AMASCOT partners used a number of technologies and processes to accomplish the test objectives, including the following:

- In-vehicle global positioning system (GPS), database of jurisdictional boundaries, and jurisdictional boundary-crossing algorithm to detect vehicle stateline crossings.
- In-vehicle recording of “significant events” (e.g., border crossing, trip start, trip stop, truck location, etc.), routes, and mileage.

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- Software and database to convert GPS coordinates to easily readable locations (e.g., city, highway, truck stop, etc.).
- Database and data file conversion software to compile mileage-by-jurisdiction data and fuel purchase information and generate IFTA quarterly reports.
- Electronic transmission of vehicle mileage by jurisdiction, fuel purchases, and IFTA quarterly reports.

The technologies and processes used during the test only generally represent those that might be developed and used if an actual marketplace develops.

The in-vehicle equipment consisted of a satellite communications transceiver fitted with an integrated single board computer (SBC), keyboard display unit (KDU), antenna, antenna cable, odometer sensor cable, and power cable, all provided by Rockwell. The SBC provided the computing and memory resources necessary for the jurisdictional boundary database, the jurisdictional border crossing algorithm, and the collected vehicle travel event and mileage data.

The satellite transceiver, KDU, antenna, and associated equipment were standard, off-the-shelf components with minor modifications to the hardware to accommodate hosting the SBC within the same mechanical housing. The standard satellite transceiver configuration provided a 24-hour messaging system with complete coverage of the United States and Canada via satellite link. By incorporating the SBC within the satellite transceiver, a convenient means to retrieve the data from the various fleets was achieved. The in-vehicle equipment collected all the pertinent trip information from the vehicle and provided a satellite extraction link to transfer the data from the vehicle to Rockwell and then CTRE on a timely basis.

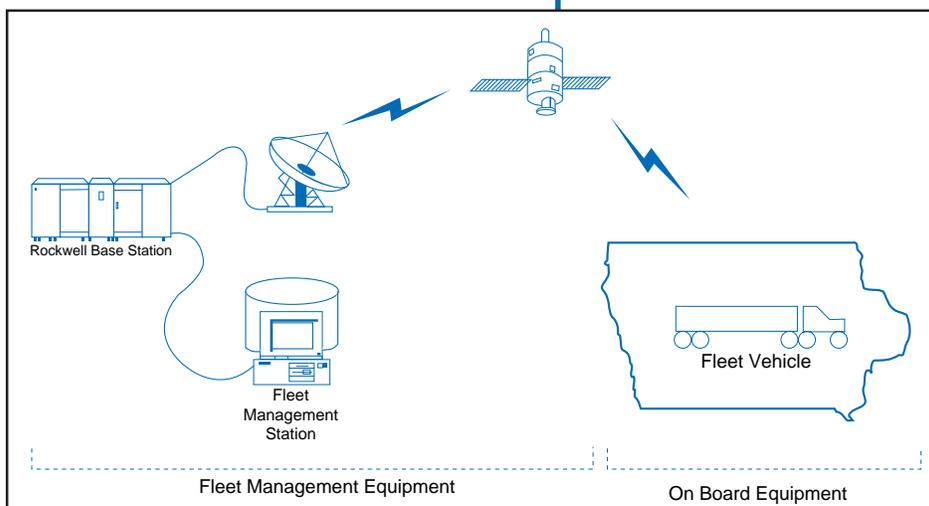
In addition to the in-vehicle equipment, a custom locational database developed by Rand McNally-TDM was used to convert the GPS locational data to readable place names (cities, towns, highways, truck stops, etc.) so the data would be auditable. Similarly, CTRE used consumer, off-the-shelf database software and programming languages to create a Windows-compatible system for tabulating the data and generating quarterly reports that followed IFTA requirements.

Test design and data collection

The test was based on installing the prototype equipment in 30 commercial vehicles from six motor carriers encompassing various sizes and market segments. Two of the carriers were based in each of Iowa, Wisconsin, and Minnesota. As each vehicle traveled during the test, daily trip report (DTR) records were created on the on-board solid state disks. Each DTR contained that vehicle's history of starts, stops, border crossings, and other events and system exceptions.

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Figure 1 shows the system diagram of both the on-board and fleet management system of the test.



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Auditors from Iowa, Minnesota, and Wisconsin take a test ride to see how the automatic data collection works.

Jurisdictional border crossing events and other significant events, such as trip starts and stops, were recorded with a code identifying the event, a position quality code, an odometer reading for when the event occurred, the vehicle's position, and the date and time. These significant events provided a trail of mileage and location data and definitive jurisdiction entrance and exit dates, locations, and odometer readings for the vehicle. Combining these data with fuel purchase information provided all the necessary information for creating and maintaining individual vehicle records for use in tabulating and reporting IFTA and IRP data.

Relevance

AMASCOT succeeded in proving the concept of automated mileage and route data collection and electronic filing for use in complying with commercial vehicle fuel tax and registration apportionment requirements. Data collected and reported by the system were accurate as checked by the participating states' IFTA and IRP auditors using three

accepted mileage and fuel record auditing techniques. The reports generated met IFTA and IRP requirements and were easy to read and audit.

Evaluation of the truck system and electronic data interchange (EDI) demonstrated that automatically collecting data that meet IFTA and IRP requirements is feasible and that electronic transfer of those data also is feasible. States can benefit through reduced data entry by staff, increased integrity of the data, reduced data storage requirements, and increased data accessibility and portability. Motor carriers can benefit through reduced data entry, reduced errors and paperwork, and electronic record keeping. The costs to motor carriers will be relatively affordable, and carriers may reap significant—33 to 50 percent—savings over current IFTA and IRP compliance costs, according to post-test interviews with carriers.

Technology providers have already begun marketing systems. These systems have the very real potential for reducing the time and paperwork necessary for motor carriers to comply with, and states to administer, the regulatory processes for vehicle registration and fuel tax filing.

Remaining issues

With the viability of the concept proven, states and motor carriers can move ahead to solve the related issues of EDI standards, EDI facilities, and electronic funds transfer. Some participating motor carriers identified concerns about access to data and data privacy issues. States face a number of issues related to achieving the infrastructure and processes to facilitate and capitalize on these capabilities to collect and report data electronically. Fortunately, these issues have achievable solutions and are being investigated through other ITS efforts. **end**

