Source: US DOT

Source: US DOT

Desired capabilities of the Smart Roadside program:

- Real-time traffic, weather, special event, and truck parking information shared with drivers

- Vehicle sensor data collected at the roadside shared with private-sector maintenance systems

- Unique vehicle identifier used for "at-highway-speed" compliance verifications by enforcement agencies

- Routing clearance information shared with drivers

- Vehicle size and weight measurements made available to enforcement personnel at the roadside

- Origin/destination information shared to determine routing information

- Construction and time restriction information shared with drivers

- Real-time driver/carrier/truck information shared with enforcement agencies for inspection decisions

- Roadside inspection results (violation and non-violation) shared with federal enforcement agencies

- Emissions data shared with carriers and agencies to calculate carbon footprint

Smart Roadside

INTRODUCTION

Smart Roadside is a system envisioned to be deployed at strategic points along commercial vehicle routes to improve the safety, mobility, and efficiency of truck movement and operations on the roadway. It is a concept where private- and public-sector motor carrier systems will continue to operate as intended and where information collected for one purpose can be shared where authorized to serve multiple stakeholders and uses. The objective is to apply advanced technologies to create more efficient and streamlined processes and to share data in real time or near-real time to maximize its utility.

THE TRANSPORTATION PROBLEM

Increasing truck travel demand is resulting in too many legally loaded commercial motor vehicles queued up at inspection stations and, thus, unnecessary delays in the U.S. supply chain. Levels of enforcement are not keeping pace with this increase in trucks traveling—resources are being strained to deliver effective enforcement programs to ensure all users of the highway are safe. The Smart Roadside program will allow screening of trucks and drivers using wireless communication between the vehicle and the infrastructure while they travel at highway speeds.

RESEARCH OVERVIEW

Source: US DOT

The Smart Roadside program is a joint modal initiative between the Federal Highway Administration (FHWA) and Federal Motor Carrier Safety Administration (FMCSA). A component of the vehicle-to-infrastructure element of the U.S. Department of Transportation (DOT) connected vehicle research initiative, the program encompasses technology and information-sharing research efforts with commercial vehicle roadside elements that are crucial to the missions of the DOT. The research goals of the Smart Roadside program are to foster the development of a prototype application that will:

- Enhance roadside enforcement operations through improved screening and automation of inspection/compliance checks

- Provide enhanced road condition and traffic information to support commercial vehicle route planning and improved access to intermodal ports, urban pick-up, and delivery locations

- Identify key components (e.g., motor carrier, commercial vehicle, commercial driver, cargo) and communicate with commercial vehicles in real time at highway speeds

- Ensure that the necessary standards, protocols, and architecture are developed to support both interoperable operations across the country and appropriate data privacy requirements.

The vision for the Smart Roadside program is one in which commercial vehicles, motor carriers, enforcement resources, highway facilities, intermodal facilities, toll facilities, and other modes on the transportation system collect data for their own purposes and share the data seamlessly with the relevant parties to improve motor carrier safety, security, operational efficiency, and freight mobility. This vision will be achieved through the application of interoperable technologies and information sharing between in-vehicle, on-the-road, and freight facility systems.

KEY ACTIVITIES

In support of the Smart Roadside initiative, FMCSA and FHWA will:

- Fund selected tests, demonstrations, and deployments

- Coordinate with state and industry representatives to identify promising applications of Smart Roadside infrastructure

- Coordinate the development of the necessary architecture and standards

- Develop appropriate guiding principles

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- Document the business case for the Smart Roadside

- Develop and implement a deployment strategy

- Maintain a Smart Roadside roadmap and projects database to coordinate FMCSA, FHWA, and other related programs and projects

- Facilitate stakeholder collaboration

- Seek collaboration with the Department of Homeland Security (DHS) and the Environmental Protection Agency (EPA).

Whenever possible, the Smart Roadside program will leverage stakeholders' current technology investments in order to augment existing programs and support new activities.

FOCUS AREAS

The primary focus areas of Smart Roadside safety research are in various stages of operation and deployment:

- **Electronic Screening (E-Screening)** is a key component of the information collection systems and communications networks that support commercial vehicle operation, referred to as the Commercial Vehicle Information Systems and Networks (CVISN). E-Screening involves automatic identification and safety assessment of a commercial vehicle in motion. With E-Screening, safe and legal vehicles are allowed to continue on their route. Enforcement resources can be used to target unsafe vehicles and carriers. Currently, E-Screening occurs at fixed stations and on-demand verification sites.

- **Virtual Weigh Stations/Electronic Permitting** was the focus of an Enforcement Technologies study conducted in 2008 and 2009. The focus of the study was to develop the foundation for roadside technologies that can be used to improve truck size and weight enforcement. Outcomes of this study included development of a concept of operations for virtual weigh stations, which led to development of the recently completed Virtual Weigh Station/e-Permitting Architecture. The Virtual Weigh Station concept will further increase the number of electronic screenings and, depending upon the virtual weigh station configuration, will provide a more enhanced safety and credentials assessment.

- **Wireless Roadside Inspection Program** research is being done to increase the number and frequency of safety inspections at the roadside and obtain data about the commercial vehicle and its driver. The program is examining technologies that can transmit safety data directly from the vehicle to the roadside and from a carrier system to a government system. The safety data being considered for transmission include basic identification data (for the driver, vehicle, and carrier), the driver's hours of service record, and sensor data that provide information on weight, tire, and brake status. Enforcement systems and staff will use this data set to support E-Screening and inspections at locations such as staffed roadside sites, virtual weigh stations, and on-demand verification sites.

- **Truck Parking** research and ITS-based project deployments will provide commercial vehicle parking information so that commercial drivers can make advanced route planning decisions based on hour-of-service constraints, location and supply of parking, travel conditions, and loading/unloading.

In addition, **Environment** and **Smart Freight Mobility** applications are being investigated for inclusion in the initial Smart Roadside research.

OUTCOME

The current commercial vehicle environment consists of numerous federal, state, regional, and private-sector programs that use a combination of manual, semi-automatic, and advanced technologies to support safety, mobility, and security. The effectiveness of these programs will be greatly improved by the Smart Roadside concept as relevant and appropriate data is shared among the current systems and they are integrated in a collaborative fashion.

Source: US DOT

The outcome of the Smart Roadside research program will be clear evidence, which can be disseminated to stakeholders, of how technologies and information sharing really help to improve commercial vehicle operations on the road. When Smart Roadside is realized, commercial vehicles will be screened electronically, with roadside equipment and on-board sensors providing most of the information that manual inspections currently capture.

RESEARCH CONTACTS

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The U.S. Government's Role

The U.S. Department of Transportation (DOT) Research and Innovative Technology Administration's Intelligent Transportation Systems (ITS) Joint Program Office fosters the development and future deployment of connected vehicle technologies. However, connected vehicle research involves all agencies within the U.S. DOT including the National Highway Traffic Safety Administration, Federal Highway Administration, Federal Motor Carrier Safety Administration, Federal Transit Administration, and Federal Railroad Administration.

The U.S. DOT and its public and private partners are working to address the technical, safety, and policy challenges and are helping to create the standards and the wireless architecture that will be the backbone of the system.

Connected vehicle research will leverage the potentially transformative capabilities of wireless technology to make surface transportation safer, smarter, and greener.

If successful, connected vehicles will ultimately enhance the mobility and quality of life of all Americans, while helping to reduce the environmental impact of surface transportation.

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