U.S. Department of Transportation

SAFETYPILOT

CONNECTED VEHICLE TECHNOLOGY

Fact Sheet: Improving Safety and Mobility Through Connected Vehicle Technology

The U.S. Department of Transportation is committed to improving safety and mobility on our nation's roadways. As we look ahead to the next stage of roadway safety in America, connected vehicle technology shows great promise in transforming the way Americans travel. Through wireless technology, connected vehicles ranging from cars to trucks and buses to trains could one day be able to communicate important safety and mobility information to one another that helps save lives, prevent injuries, ease traffic congestion, and improve the environment.

HOW CONNECTED VEHICLE TECHNOLOGY WORKS

The U.S. Department of Transportation is currently collaborating with some of the world's largest automobile manufacturers to research how wireless technology can enable vehicles to communicate with each other and with the infrastructure around them. Connected vehicle technology—vehicle-to-vehicle and vehicle-to-infrastructure communications—could one day alert motorists of dangerous roadway conditions, impending collisions, or dangerous curves. Connected vehicles could also "talk" to traffic signals, work zones, toll booths, school zones, and other types of infrastructure.

Connected vehicle systems are based on Dedicated Short Range Communications (DSRC)—a technology similar to Wi-Fi—which is fast, secure, reliable, and unlikely to be vulnerable to interference. Using either in-vehicle or after market devices that continuously share important safety and mobility information, vehicles ranging from cars to trucks and buses to trains would be able to "talk" to each other and to different types of roadway infrastructure.

IMPROVING SAFETY

Analyses by the U.S. Department of Transportation's National Highway Traffic Safety Administration show connected vehicle technology could potentially address approximately 80 percent of the crash scenarios involving non-impaired drivers. Specifically, NHTSA research shows that this technology could help prevent the majority of types of crashes that typically occur in the real world, such as crashes at intersections or while changing lanes.

- Through in-vehicle warnings, drivers would be alerted to imminent crash situations, such as merging trucks, cars in the driver's blind side, or when a vehicle ahead of them brakes suddenly.
- By communicating with roadside infrastructure, drivers would be alerted when they are entering school zones, if workers are on the side of the road, and if an upcoming traffic light is about to change.

IMPROVING MOBILITY

According to the Texas Transportation Institute, American drivers spent 4.8 billion hours stuck in traffic in 2010—the equivalent of nearly one full work week for every traveler on our roadways each year. Connected vehicle technology could enable drivers and transportation system operators to make smart choices to reduce travel delay.

- Anonymous signals in vehicles would help generate up-to-the-minute data on how, when, and where vehicles travel in real time. Informed travelers may be able to avoid congestion by taking alternate routes, using public transit, or by rescheduling their trip.
- Connected vehicles could one day also include buses, trains, and other forms of public transit. By providing real-time information, connected vehicle technology would give travelers a realistic idea of when transit vehicles will arrive while improving bus and train connections to make public transportation more appealing to everyone.
- This technology could also help pave the way to other innovations that improve the way Americans live and travel.

"Thanks to the efforts of automakers and the safety community traffic fatalities have reached historic lows. Despite these great strides though, more than 32,000 people are still killed on our nation's roads every year. That's why we must remain vigilant in our effort to improve safety. This research should bring us a step closer to what could be the next major safety breakthrough."

— U.S. Transportation Secretary ***Ray LaHood***

IMPROVING THE ENVIRONMENT

According to the Texas Transportation Institute, the total amount of wasted fuel topped 3.9 billion gallons in 2009, the latest year that this data is available. Connected vehicle technology could give motorists the real-time information they need to make "greener" transportation choices. Information about traffic conditions would help motorists eliminate unnecessary stops and let their vehicles reach optimal fuel-efficiency.

A COLLABORATIVE APPROACH TO CONNECTED VEHICLE RESEARCH

Working together with the automotive industry, the U.S. Department of Transportation's National Highway Traffic Safety Administration, Research and Innovative Technology Administration, and Federal Highway Administration—in coordination with other federal and state agencies—are conducting research to better understand how vehicle-to-vehicle and vehicle-to-infrastructure systems that use connected vehicle (DSRC) technology can improve safety and mobility—and whether they could be effectively applied in the real world. Current research efforts are focused on vehicle-to-vehicle safety applications that would operate alongside and in concert with sensor-based crash avoidance technologies that are already on the market and available to consumers. This research is being conducted through partnering agreements including the Vehicle Infrastructure Integration Consortium, University of Michigan Transportation Research Institute and the Crash Avoidance Metrics Partnership.

Eight major automotive manufacturers are providing support for the Department's research through partnering agreements: Ford Motor Company, General Motors LLC., Honda R&D Americas, Inc., Hyundai-Kia America Technical Center, Inc., Mercedes-Benz Research and Development North America, Inc., Nissan Technical Center North America, Toyota Motor Engineering & Manufacturing North America, Inc. and Volkswagen Group of America, Inc.

SAFETY PILOT OF CONNECTED VEHICLE TECHNOLOGY

The Safety Pilot program is a two-phase, joint research initiative led by NHTSA and RITA to examine connected vehicle technology and real-world applications. The Safety Pilot will lay the groundwork for understanding how this technology interacts in a real-world setting between vehicles and between vehicles and the infrastructure. By evaluating connected vehicle technology, the Department

"With its potential to save lives and prevent injuries, connected vehicle technology could be a real game-changer for vehicle safety."

— *NHTSA Administrator* ***David Strickland***

expects to gather the information it needs to decide if these innovations are ready—and effective enough—to move forward with additional vehicle-to-vehicle communications programs, including potential rulemaking activities.

PHASE ONE – DRIVER ACCEPTANCE CLINICS

In August 2011, the Department began its first phase of research through a series of driver acceptance clinics. Driver clinics were designed to obtain driver acceptance data in cars equipped with "vehicle-to-vehicle" safety systems. The driver assistance applications that were tested included in-car collision warnings, "do not pass" alerts, warnings that a vehicle ahead has stopped suddenly, and other similar safety messages. The six-month program evaluated a total of approximately 700 drivers at the six driver clinics in Michigan, Minnesota, Florida, Virginia, California, and Texas and was completed in January 2012. The information gathered from the program showed that an overwhelming majority of drivers (9 out of 10) would like to have the vehicle-to-vehicle features included in their own vehicles and most believe the technology would be useful in improving driver safety.

Nine out of 10 drivers agreed that they would like to have vehicle-to-vehicle safety features in their own vehicles and believe the technology would be useful in improving driver safety.

Dates and locations included:

- August 8–11, 2011: Michigan International Speedway in Brooklyn, MI
- September 23–29, 2011: Brainerd International Speedway, Brainerd, MN
- October 22–25, 2011 Walt Disneyworld Speedway, Orlando, FL
- November 7–10, 2011: Smart Road Virginia Tech Transportation Institute, Blacksburg, VA
- December 6–9, 2011: Texas Motor Speedway in Fort Worth, TX
- January 18–21, 2012: Alameda Naval Air Station, Alameda, CA

PHASE TWO – MODEL DEPLOYMENT

On August 21, 2012, the U.S. Department of Transportation and its research partners will launch the second part of the Safety Pilot with a model deployment to further test connected vehicle technology in a year-long effort from summer 2012 through summer 2013. Supported by a diverse team of industry, public agencies, and academia, the model deployment will operate on roads in Ann Arbor, Michigan, and test a limited number of vehicle-to-infrastructure safety applications in addition to continuing the research on vehicle-to-vehicle safety applications.

The U.S. Department of Transportation contracted with the University of Michigan's Transportation Research Institute to conduct the model deployment, which will use connected vehicle technology in a real-world environment and gather extensive data about system operability, effectiveness, and security. The test site will create a highly concentrated environment of vehicles "talking" to each other using approximately 3,000 vehicles (including

"The past several decades of auto safety have been dedicated to surviving crashes, but the future will be about avoiding crashes. That is what connected vehicles are all about."

— *RITA Deputy Administrator* ***Greg Winfree***

cars, trucks, and buses) equipped with vehicle-to-vehicle communications devices. These vehicles will send and receive electronic data from other equipped vehicles at the site and translate the data into a warning to the driver if and when specific safety hazards occur.

The devices that will be tested include systems that are directly embedded in the vehicle, as well as aftermarket safety systems, and "simple" communications beacons that are brought into the vehicle. All systems and devices emit a basic safety message 10 times per second that forms the data stream that other in-vehicle devices use to determine when a potential traffic hazard exists. Combined with the vehicle's own data, this information provides highly accurate data that is used by the crash avoidance safety applications. The Safety Pilot Model Deployment will obtain empirical test data for determining the technologies' effectiveness at reducing crashes. These capabilities will also be extended to a limited set of applications in which vehicles will communicate with highway infrastructure (or "vehicle-to-infrastructure").

The information collected from both phases of the Safety Pilot, along with the results of other key research projects being conducted in the connected vehicle program, will be used by NHTSA to determine by 2013 whether to proceed with additional vehicle-to-vehicle communication activities, including possible future rulemakings.

RESEARCH & REPORTS:

NHTSA. (2011, October). USDOT Connected Vehicle Research Program: Vehicle-to-Vehicle Safety Application Research Plan. (Report No. DOT HS 811 373). Washington, DC: National Highway Traffic Safety Administration. Available at www.nhtsa. gov/DOT/NHTSA/NVS/Crash%20Avoidance/Technical%20Publications/2011/811373.pdf.

Ahmed-Zaid, F., Bai, F., Bai, S., Basnayake, C., Bellur, B., Brovold, S., Brown, G., … & VanSickle, S. (2011, August). Vehicle safety communications – Applications VSC-A, Second annual report, January 1, 2008 through December 31, 2008. (Report No. DOT HS 811 466). Washington, DC: National Highway Traffic Safety Administration. Available at www.nhtsa.gov/DOT/NHTSA/NVS/Crash%20Avoidance/Technical%20Publications/2011/811466.pdf.

Najm, W. G., Koopmann, J., Smith, J. D., & Brewer, J. (2010, October). Frequency of target crashes for IntelliDrive safety systems. (Report No. DOT HS 811 381). Washington, DC: National Highway Traffic Safety Administration. Available at www.nhtsa.gov/DOT/NHTSA/NVS/Crash%20Avoidance/Technical%20Publications/2010/811381.pdf.

FOR MORE INFORMATION:

Troy Green
U.S. Department of Transportation
National Highway Traffic Safety Administration
202-366-9550
troy.green@dot.gov

Nancy Wilochka
U.S. Department of Transportation
Research and Innovation Technology Administration
202-366-5128
nancy.wilochka@dot.gov

Francine Romine
University of Michigan
Transportation and Research Institute
734-763-4668
fromine@umich.edu

Jim Barbaresso
HNTB Corporation
313-961-3330
jbarbaresso@hntb.com

U.S. Department of Transportation
National Highway Traffic Safety Administration
Research and Innovative Technology Administration

NHTSA
www.nhtsa.gov