U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON ENERGY AND COMMERCE

June 23, 2015

To: Members, Subcommittee on Commerce, Manufacturing, and Trade

From: Committee Majority Staff

Re: Hearing on "Vehicle-to-Vehicle Communications and Connected Roadways of the Future"

I. INTRODUCTION

On Thursday, June 25, 2015, at 10:00 a.m. in 2123 Rayburn House Office Building, the Subcommittee on Commerce, Manufacturing, and Trade will hold a hearing entitled "Vehicle-to-Vehicle Communications and Connected Roadways of the Future." This hearing will give Members of the Subcommittee an opportunity to learn about vehicle-to-vehicle (V2V) communications technology and what it means for safety, the future of the nation's roadways, and the U.S. economy. In addition to examining the consumer safety and economic impact of this new automotive technology, the hearing will explore the timeframe for deployment. The hearing also will explore the current regulatory framework governing vehicle safety and the National Highway Traffic Safety Administration's (NHTSA) role and whether it is equipped to address V2V communications and other new automotive technologies and intelligent transportation systems poised to enter the marketplace.

This hearing will focus on what the technology could mean for safety, and how to bring the technology safely into the marketplace.

II. WITNESSES

- Peter Sweatman, Ph.D., Director, University of Michigan Transportation Research Institute;
- Nat Beuse, Associate Administrator, Vehicle Safety Research, National Highway Traffic Safety Administration;
- David St. Amant, President and Chief Operating Officer, Econolite Group Inc.;
- Barry Einsig, Global Transportation Executive, Cisco; and
- Harry Lightsey, Executive Director, Global Connected Customer Experience, General Motors.

III. BACKGROUND

A. Overview: Vehicle-to-Vehicle Communications

Vehicle-to-vehicle communications technology is a communications system "designed to transmit basic safety information between vehicles to facilitate warnings to drivers concerning impending crashes."[1] The types of basic safety information exchanged between vehicles include vehicle speed, location, directional heading, brake status, and other messages that give drivers more information about roadway activity occurring in the surrounding environment.[2] When a vehicle receives a message from another vehicle, the information may be communicated to drivers through an audible alert, cameras, or flashes or icons on the windshield or frontal dashboard instrument panel.[3] This exchange of real-time information enhances situational awareness and can help inform drivers of hazards, offer warnings, and provide other advisories that assist drivers in detecting safety risks on the road.[4]

The primary benefit of V2V communications technology is increased vehicle and roadway safety.[5] According to the Department of Transportation (DOT), V2V technologies, if widely deployed, could provide safety warnings to drivers in at least 76 percent of potential multi-vehicle collisions involving a light vehicle.[6] When V2V technologies are combined with V2I (vehicle-to-infrastructure) communications systems, the DOT estimates that this technology could help prevent about 81 percent of all vehicle crashes involving non-impaired drivers, 83 percent of all light-vehicle crashes, and seventy-two percent of all heavy truck crashes annually.[7] Overall, the reduction in traffic accidents due to V2V is projected to prevent approximately 5.1 million accidents a year and save 18,000 lives.[8]

B. Dedicated Short Range Communications

V2V communications are enabled by Dedicated Short Range Communications (DSRC) technology. This is a two-way, short-to-medium-range wireless communications technology that can transmit and receive messages within a 300 meter range and permit a very high transmission

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[1] Harding J., Powell, G., R., Yoon, R., Fikentscher, J., Doyle, C., Sade, D., Lukuc, M., Simons, J., & Wang, J. (2014, August). Vehicle-to-vehicle communications: Readiness of V2V technology for application. (Report No. DOT HS 812 014). Washington, DC: National Highway Traffic Safety Administration. (V2V Readiness Report).
[2] *Id.*
[3] Howard, Bill. V2V: What Are Vehicle-to-Vehicle Communications and How Do They Work? February 6, 2014. Available at: http://www.extremetech.com/extreme/176093-v2v-what-are-vehicle-to-vehicle-communications-and-how-does-it-work/3.
[4] *V2V Readiness Report.*
[5] Department of Transportation, NHTSA. Federal Motor Vehicle Safety Standards: Vehicle-to-Vehicle Communications. Advanced Notice of Proposed Rulemaking. [Docket No. NHTSA–2014–0022]. Washington, DC. August 20, 2014. Available at: http://www.gpo.gov/fdsys/pkg/FR-2014-08-20/pdf/2014-19746.pdf.
[6] GAO Report to Congressional Requesters. Intelligent Transportation Systems: Vehicle-to-Vehicle Technologies Expected to Offer Safety benefits, but a Variety of Deployment Challenges Exist. November 2013. Available at: http://www.gao.gov/assets/660/658709.pdf.
[7] U.S. Department of Transportation: Office of the Assistant Secretary for Research and Technology: Intelligent Transportation Systems Joint Program Office. Connected Vehicle Research in the United States. Available at: http://www.its.dot.gov/connected_vehicle/connected_vehicle_research.htm.
[8] See: http://www.washingtonpost.com/local/trafficandcommuting/direct-communication-between-car-computers-may-reduce-accidents-by-up-to-80-percent/2014/02/03/b55e9330-8d1a-11e3-833c-33098f9e5267_story.html.

of data – updating and broadcasting messages to a driver up to 10 times per second.[9] Devices using DSRC technology can be installed in vehicles during the original manufacturing process or through aftermarket installation. The devices can support the exchange of information between vehicles, infrastructure, and other roadside equipment and give the vehicle and the driver a 360-degree view of roadway activity.[10]

DSRC currently is considered the most promising standard for V2V communications technology because of its reliability and capacity to support active vehicle safety applications.[11] For example, it can support high-speed, low latency communications; function in high-speed vehicle mobility conditions and maintain performance in extreme weather environments; and support multi-path transmissions and both V2V and V2I communications.[12] DSRC also can support message authentication (e.g. verification that a message is coming from a trusted source) and privacy controls.[13]

The auto industry continues to test the readiness of DSRC for vehicle communications in real-world driving scenarios. Additionally, the Middle Class Tax Relief and Job Creation Act called for the Federal Communications Commission (FCC) and the Department of Commerce's National Telecommunications and Information Administration (NTIA), to undertake a parallel effort to determine if the portion of wireless spectrum supporting DSRC can be shared with other unlicensed Wi-Fi devices without causing harmful interference to V2V communications.[14] In May, the DOT, FCC, and NTIA briefed Subcommittee on Communications and Technology staff on the testing progress for V2V communications.[15] All agencies reported that they were working together with private industry stakeholders on test devices and protocols that can be used to test whether the spectrum can be shared without disrupting vehicle communications technology.[16] The expectation is that testing could begin sometime within the next year.[17]

C. The Connected Vehicle Safety Pilot Program

In 2011, the DOT created the Connected Vehicle Safety Pilot (Safety Pilot) research program to support the development of V2V and V2I safety applications using DSRC

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[9] RITA Intelligent Transportation Systems – DSRC: The Future of Safer Driving Fact Sheet. Available at: http://www.its.dot.gov/factsheets/dsrc_factsheet.htm. See also U.S. Department of Transportation, NHTSA. V2V Communications Fact Sheet. Available at: http://www.safercar.gov/v2v/index.html.

[10] NHTSA Press Release. U.S. Department of Transportation Announces Decision to Move Forward with Vehicle-to-Vehicle Communication Technology for Light Vehicles. February 3, 2014. Available at: http://www.nhtsa.gov/About+NHTSA/Press+Releases/2014/USDOT+to+Move+Forward+with+Vehicle-to-Vehicle+Communication+Technology+for+Light+Vehicles.

[11] Yasser L. Morgan. Managing DSRC and WAVE Standards Operations in a V2V Scenario. International Journal of Vehicular Technology. Volume 2010, Article ID 797405. Available at: http://dx.doi.org/10.1155/2010/797405. See also *V2V Readiness Report.*

[12] See: http://www.its.dot.gov/factsheets/dsrc_factsheet.htm.

[13] *Id*. See also *V2V Readiness Report*.

[14] Moore, Linda K. CRS Insights: Spectrum Needs of Self-Driving Vehicles. February 12, 2015. Available at: http://www.crs.gov/pages/Insights.aspx?PRODCODE=IN10168&source=search.

[15] FCC, NTIA, and DOT Representatives, Briefing to Committee Staff (May 19, 2015).

[16] *Id.*

[17] *Id.*

technology.[18] The Safety Pilot also was designed to determine the real-world effectiveness of V2V and V2I communications systems in reducing crashes and whether regulatory action by the National Highway Traffic Safety Administration (NHTSA) was warranted to speed the adoption of this crash avoidance technology among vehicle manufacturers.[19]

The Safety Pilot consisted of two main components: the Driver Clinics and the Model Deployment.[20] The Driver Clinics were conducted at six sites across the U.S. (Brooklyn, Michigan; Brainerd, Minnesota; Orlando, Florida; Blacksburg, Virginia; Fort Worth, Texas; and Alameda, California) from August 2011 through January 2012.[21] The clinics were used to assess how motorists responded to and accepted V2V technology in a controlled environment.[22] According to NHTSA, the findings from the clinics generally were positive, indicating that nine out of ten drivers had an interest in using the technology in real-world driving scenarios.[23] There was, however, uncertainty among some motorists about whether or not a driver might confuse certain safety warnings.[24]

The Model Deployment was conducted by the University of Michigan Transportation Research Institute (UMTRI) in Ann Arbor, Michigan from August 2012 to February 2014.[25] This part of the Safety Pilot was designed to test the effectiveness of V2V and V2I technology in reducing fatalities and injuries in motor vehicle crashes. The Model Deployment outfitted a combination of 2,800 vehicles, including cars, trucks, and buses, with DSRC devices from multiple suppliers.[26] During implementation, V2V and V2I technologies were tested on public streets in highly concentrated areas and demonstrated an ability to transmit and receive messages from different DSRC devices.[27] The technologies also proved effective at mitigating or preventing potential crashes.[28] From both the Model Deployment and Driver Clinics, NHTSA concluded that "V2V technology can work in a real-world environment on actual roads with regular drivers."[29] However, in order to ensure the reliability and resiliency of V2V when formally deployed in consumer-driven vehicles, additional refinements would need to be made in other areas, including the use of wireless spectrum, V2V device certification, driver and vehicle interface controls, and performance standards and requirements, among other issues.[30]

D. NHTSA's V2V Advanced Notice of Proposed Rulemaking

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[18] *V2V Readiness Report.*
[19] See http://www.its.dot.gov/connected_vehicle/connected_vehicle_apps.htm.
[20] *Id.*
[21] *V2V Readiness Report.*
[22] *Id.*
[23] *Id.*
[24] *Id.*
[25] *Id.*
[26] *Id.*
[27] *Id.*
[28] *Id.*
[29] *Id.*
[30] *Id.*

Following the completion of the Safety Pilot, NHTSA initiated plans to move forward with a regulatory proposal on vehicle communications technology. On February 3, 2014, NHTSA announced that it would begin working on a rulemaking to require V2V devices in new vehicles due to their ability to warn drivers of safety risks and help them avoid impending crashes.[31]

On August 18, 2014, NHTSA issued an advanced notice of proposed rulemaking (ANPRM) and an accompanying technical report, "Vehicle-to-Vehicle Communications Readiness of V2V Technology for Application," formally beginning the rulemaking process to create a new Federal Motor Vehicle Safety Standard (FMVSS) on V2V.[32] The FMVSS would require V2V communications capability for new light vehicles and also would create minimum performance requirements for V2V devices and safety messages.[33] To assist NHTSA in carrying out the regulatory proposal, the ANPRM sought additional comment on: the types of crash scenarios that should be addressed by V2V; NHTSA's legal authority over non-integrated aftermarket equipment; technical standards for DSRC, such as interoperability requirements and spectrum sharing; public acceptance of V2V; driver privacy and vehicle security; liability exposure to automakers offering V2V safety warning technologies; and the overall costs and benefits of providing V2V safety applications. The comment period for the ANPRM closed October 20, 2014.

To gather additional information and feedback on the security-related aspects of V2V communications, NHTSA issued a Request for Information (RFI) on October 15, 2014, regarding the development and governance of a "Security Credential Management System" (SCMS).[34] The creation of a SCMS would help ensure that messages sent between vehicles and other entities originated from a trusted source and were protected from outside interference or manipulation.[35] Comments addressing the development and governance of the SCMS were due by December 15, 2014.

On May 13, 2015, NHTSA announced plans to accelerate its timetable for a rulemaking requiring V2V communications devices in new vehicles.[36] The agency now plans to send a proposed rule to the Office of Management and Budget for review at the end of this year instead

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[31] NHTSA Press Release. U.S. DOT Announces Decision to Move Forward with Vehicle-to-Vehicle Communication Technology for Light Vehicles. February 3, 2014. See: http://www.nhtsa.gov/About+NHTSA/Press+Releases/2014/USDOT+to+Move+Forward+with+Vehicle-to-Vehicle+Communication+Technology+for+Light+Vehicles.

[32] NHTSA Press Release. U.S. Department of Transportation Issues Advanced Notice of Proposed Rulemaking to Begin Implementation of Vehicle-to-Vehicle Communications Technology. August 18, 2014. See: http://www.nhtsa.gov/About+NHTSA/Press+Releases/2014/NHTSA-issues-advanced-notice-of-proposed-rulemaking-on-V2V-communications\.

[33] Department of Transportation, NHTSA . 49 CFR Part 571. Docket No. NHTSA-2014-0022. RIN 2127-AL55. Federal Motor Vehicle Safety Standards: V2V Communications. Federal Register Vol. 79, No. 161. August 20, 2014, Proposed Rules. ("V2V ANPRM") Available at: http://www.regulations.gov/#!documentDetail;D=NHTSA-2014-0022-0002.

[34] http://www.gpo.gov/fdsys/pkg/FR-2014-10-15/pdf/2014-24482.pdf.

[35] *Id.*

[36] NHTSA Press Release. Transportation Sec. Foxx Announced Steps to Accelerate Road Safety Innovation. May 13, 2015. See: http://www.nhtsa.gov/About+NHTSA/Press+Releases/2015/nhtsa-will-accelerate-v2v-efforts.

of in 2016 as originally planned.[37] NHTSA also reported that it would accelerate testing to determine if the wireless spectrum used for vehicle communications could be shared with other unlicensed users.[38]

E. Protecting Driver Privacy and Vehicle Security

V2V communications technology – and connected cars generally – have brought increased attention to issues related to vehicle security and driver privacy because many of the new safety applications, services, and crash avoidance technologies, including V2V, are provided using information obtained directly from vehicle systems.[39] While V2V technology "does not involve exchanging or recording personal information or tracking vehicle movements," nor does the information sent between vehicles identify those vehicles, ensuring vehicle security and driver privacy will be an essential part of building consumer trust and acceptance in advanced automotive technologies and fully realizing the safety benefits of V2V and intelligent transportation systems.[40]

In NHTSA's V2V ANPRM, it outlined plans to issue a draft Privacy Impact Assessment (PIA) analyzing the privacy implications of a V2V requirement.[41] The PIA will "provide the public with a more detailed basis on which to evaluate potential privacy risks and proposed mitigation controls associated with V2V technology."[42] The PIA is expected to be issued concurrent with NHTSA's V2V rulemaking.

IV. ISSUES

The following issues may be examined at the hearing:

- How will a rulemaking requiring V2V communications in new vehicles impact used cars on the road today?
- What driver education is necessary to prepare drivers to operate vehicles equipped with V2V capability?
- How does the implementation of V2V technology foster the development of vehicle automation technologies?
- How is the auto industry preparing a rollout that will allow this technology to evolve? Will any technological evolution require ongoing government oversight?

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[37] *Id.*
[38] *Id.*
[39] See: http://www.autoalliance.org/index.cfm?objectid=865F3AC0-68FD-11E4-866D000C296BA163.
[40] See: http://www.nhtsa.gov/About+NHTSA/Press+Releases/2014/ci.USDOT+to+Move+Forward+with+Vehicle-to-Vehicle+Communication+Technology+for+Light+Vehicles.print.
[41] *V2V ANPRM.*
[42] *Id.*

- What is a realistic timeframe by which drivers will see the benefits of this technology?

V. STAFF CONTACTS

If you have any questions regarding this hearing, please contact Paul Nagle and Olivia Trusty of the Committee staff at (202) 225-2927.