**Statement of Nathaniel Beuse, Associate Administrator for Vehicle Safety Research, National Highway Traffic Safety Administration**
**Before the**
House Committee on Energy and Commerce Subcommittee on Commerce, Manufacturing and Trade
Hearing On
"Driving a Safer Tomorrow: Vehicle-to-Vehicle Communications and Connected Roadways of the Future."

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Good morning Chairman Burgess, Ranking Member Schakowsky, and members of the subcommittee. I appreciate this opportunity to testify about Vehicle-to-Vehicle (V2V) communications and the extensive potential safety benefits that could result from fully deployed V2V technology.

In 2013, there were over 5.7 million motor vehicle crashes in the United States, and 32,719 people died in vehicle-related crashes. The consequences of these crashes range from personal tragedies that impact individual families forever, to billions of dollars in economic damage due to lost productivity, increased congestion, environmental impact and other negative consequences. While we have made significant improvements in motor vehicle safety, vehicle crashes remain the leading cause of death for ages 11 to 27—and a major factor in most other age ranges.

The National Highway Traffic Safety Administration's (NHTSA) mission is to reduce deaths, injuries, and economic loss resulting from motor vehicle crashes. NHTSA's vehicle safety activities will continue to enhance occupant protection when crashes occur, but, as Secretary Foxx recently said, "The Department wants to speed the nation toward an era when vehicle safety isn't just about surviving crashes; it's about avoiding them." Our studies show that 94 percent of crashes are due to driver error, and technologies are now available or being developed that can help drivers avoid the crashes in the first place. An increasing part of NHTSA's work is accelerating research on these types of technologies. NHTSA's research is focused on emerging crash avoidance technologies that help the driver operate his or her vehicle in a safe manner, warn the driver of an impending collision, and can even take control of the vehicle's brakes or steering if such warnings are not heeded.

NHTSA's testing and analysis of Vehicle-to-Vehicle ("V2V") communications crash avoidance technology, conducted in close cooperation with the Intelligent Transportation Systems (ITS) Joint Program Office (JPO) and the Federal Highway Administration (FHWA), show it can potentially address approximately 80% of crashes involving two or more motor vehicles. When fully realized, this communications technology may even be able to address crashes involving pedestrians and cyclists, which represent an increasing share of total motor vehicle involved fatalities. V2V technology is based on vehicles wirelessly sharing their position, speed and heading information with each other in near real-time fashion. Each vehicle uses the information to determine if a collision is imminent, and then warns the driver as needed.

**Crash Avoidance**

V2V is anticipated to augment today's crash avoidance technologies such as forward collision warning, blind spot warning, and automatic emergency braking systems. V2V technology would potentially be fused with other crash avoidance technologies that rely on sensors such as radar or cameras to further improve the effectiveness of these safety systems— allowing for potential crash situations to be detected sooner and more reliably. Because V2V would allow for enhanced 360 degree situational awareness and allows a vehicle to "see" around corners, it can assist the driver in many challenging crash scenarios that are difficult for other types of sensors to detect—including, for example, intersection related crashes, one of the most deadly crash types.

Examples of what V2V-enabled safety applications may do for drivers:

- Warn if there is sudden braking in the vehicles ahead.
- Help drivers avoid collisions at intersections by alerting drivers if another vehicle approaching the intersection may run the red light. If you are the driver who might run a red light, V2V will send you an alert of a potential collision with cross traffic. Warn drivers of another vehicle in their blind spot.
- Inform drivers of bad road weather conditions, warning drivers of unsafe road conditions experienced by others ahead, enabling the driver to slow down or change routes altogether.
- V2V also has the potential to help enable warnings about pedestrians in crosswalks n crosswalks or work zones ahead.

NHTSA and a growing number of suppliers and vehicle manufacturers believe V2V will provide an important capability that can be leveraged to improve the performance, reliability and safety of fully self-driving vehicles, thus allowing for the full potential of a connected-automated vehicle and infrastructure environment to be realized.

V2V technology relies on licensed, dedicated short range communications (DSRC) to operate. In turn, our August 2014 Advance Notice of Proposed Rulemaking (ANPRM) relies on DSRC spectrum availability free of harmful interference. In 1999, the Federal Communications Commission (FCC) had the foresight to allocate the 5.9 GHz spectrum to ITS America and to the American Association of Highway and Transportation Official (AASHTO) to enable technology development with industry and government partners.

NHTSA and other modes within DOT have been conducting research on V2V technology for over a decade. Our collective work has focused on:

- supporting the development of industry standards to ensure interoperability (a key factor for the technology to be successful);
- developing and demonstrating safety applications to address specific types of crashes
- researching driver interface issues to ensure the technology provides warnings without causing distraction, and
- analyzing customer acceptance, reliability, cost and other deployment issues.

**Security and Privacy**

NHTSA has placed special emphasis on researching the security and privacy issues surrounding V2V. NHTSA does not believe that V2V technology will involve collecting or exchanging personal information or tracking specific drivers or their vehicles. The information sent between vehicles would not *identify* those vehicles, but would merely contain basic safety data, such as speed and position, ten times per second. It is not anticipated to record or store that information. In fact, the system as contemplated contains several layers of security and privacy protection to ensure that vehicles can rely on messages sent from other vehicles to accomplish safety goals.

A key research milestone was reached in 2013 when the technology was taken out of the lab and put into the real world for testing. The ITS JPO-managed Safety Pilot Model Deployment tested 3000 prototype vehicles from six different manufacturers driven by regular citizens going about their daily business for one year in the Ann Arbor, Michigan area. The promise of this technology based on the data collected from that study helped shape NHTSA's decision to move forward with V2V technology.

**ANPRM and V2V Report**

In August 2014, NHTSA issued an Advance Notice of Proposed Rulemaking (ANPRM) that requested comment on the comprehensive "Vehicle-to-Vehicle Communications: Readiness of V2V Technology for Application Report" (or Readiness Report), which provided details on the technology, results of testing programs, benefits, deployment considerations, as well as security, policy, privacy and regulatory issues. The ANPRM initiated rulemaking to create a new Federal Motor Vehicle Safety Standard to require V2V communications capability on all light vehicles.

- NHTSA's ANPRM outlined how the agency could require the basic radio system, security features, and functionality to support interoperable communications—but would not require specific safety applications. Such an approach will allow the market to innovate and compete in offering safety applications.

Key Findings and issues addressed in the ANPRM and Readiness Report included:

- V2V devices installed in light vehicles as part of the Connected Vehicle Safety Pilot Model Deployment were able to transmit and receive messages from one another, with a security management system providing trusted and secure communications among the vehicles during the Model Deployment.
- Safety applications enabled by V2V, which include intersection movement assist (IMA), forward collision warning (FCW), and left turn assist (LTA), showed they have the potential to mitigate or prevent potential crashes. Additional refinement to the prototype safety applications used in the Model Deployment is needed before minimum performance standards could be finalized and issued.
- The agency has the legal authority to mandate V2V devices in new light vehicles, and could also require them to be installed in commercial vehicles already in use on the road.

NHTSA received more than 900 comments in response to the ANPRM and the V2V Readiness Report. The automotive manufacturers stated that the Federal government needed to assume a large role in establishing key elements of the V2V environment, including establishing common operating criteria for V2V devices, establishing a security credentials system, and preserving the 5.9 GHz spectrum for V2V safety. Automotive suppliers generally expressed support for the technology and indicated the technology and standards for the technology were mature enough

for initial deployment. Safety advocacy groups also expressed support, but emphasized the importance of ensuring interference-free spectrum for V2V.

Many auto companies are embracing V2V technology as demonstrated by GM's September 2014 Press announcement that they would be implementing V2V technology with a target of 2017 on select models. GM acknowledged in their comments that NHTSA's rulemaking actions on V2V technology is needed to fully realize its benefits.

In May of this year, Secretary Foxx announced USDOT's intent to accelerate the V2V rulemaking activities and issue a proposal in 2016. NHTSA has accepted the challenge and our Agency is working diligently to meet this goal.

In addition, Secretary Foxx announced our readiness to accelerate testing of potential interference from sharing arrangements in the 5.9 GHz spectrum. Given the interest in determining whether the 5.9GHz spectrum reserved for V2V communications can be shared with unlicensed users, the Department is committed to completing a preliminary test plan within 12 months after industry makes production-ready devices available for testing.

NHTSA announced its intent to move forward with V2V in February 2014 because of its demonstrated potential to dramatically improve vehicle safety and its importance as a stepping stone toward achieving safe automated driving. The USDOT-led research program has demonstrated through extensive analysis, controlled testing, and real world field studies that V2V communications offers an important opportunity to dramatically improve safety on our Nation's roads. Thank you for this opportunity to testify and I look forward to your questions.

**Key V2V Milestone Dates and Activities from 2013 to the Present**

- **November 2013**: GAO issues Report on Vehicle to Vehicle technology. What GAO found: *The development of vehicle-to-vehicle (V2V) technologies has progressed to the point of real world testing, and if broadly deployed, they are anticipated to offer significant safety benefits.*

- **February 2014**: Secretary of Transportation Anthony Foxx announces intent to move forward with a V2V regulatory proposal "within this Administration" (by 2016).

  **August 2014**: NHTSA issues an ANPRM requesting comment on its comprehensive "Vehicle-to-Vehicle Communications: Readiness of V2V Technology for Application" report that provides details on the technology, results of testing programs, benefits, deployment considerations, as well as security, policy, privacy and regulatory issues. The ANPRM outlined a regulatory approach that considers mandating the radio communication system only.

- **October 2014**: NHTSA issues a *Request for Interest* related to deploying and operating a Security Credential Management System (SCMS) that would support vehicle to vehicle communications to ensure security and protect privacy. Responses received from 21 entities expressing varying degrees of interest.

- **October 2014**: FHWA previews summary of Vehicle to Infrastructure (V2I) Deployment Guidance document at ITS World Congress in Detroit. Provides States and local transportation agencies with guidance on deploying DSRC infrastructure. Initial publication of the guidance along with "deployment tool kits" to be available fall of 2015.

- **October 2014**: General Motors announces its intent to offer DSRC technology on production vehicles beginning in 2017.

- **January 2015**: USDOT issues Broad Agency Announcement seeking proposals from State and local transportation agencies to participate in Connected Vehicle Pilot Deployments. Multiple proposals received in March.

- **April 2015**: The National Academies Committee (an independent review committee of the Transportation Research Board) issues a Letter Report on its review of USDOT's "*Status of the Dedicated Short-Range Communications Technology and Applications [Draft] Report to Congress*". Key findings from Exec Summary:
  - The use of 5.9 gigahertz (GHz) DSRC is appropriate for the connected vehicle initiative. The committee agrees with the DSRC report's arguments concerning the low latency, privacy protection, and other benefits this technology offers compared with other communications technologies for safety-critical messages.
  - With regard to DSRC as the chosen low latency technology for communicating safety-critical information, the committee agrees with the DSRC report conclusion that proposed spectrum sharing in the 5.9 GHz band is the most serious risk and uncertainty for the program, but it is not the only one. The committee believes that unless local area wireless technology (Wi-Fi) and other unlicensed and licensed technologies are determined not to interfere with DSRC, the potential benefits of the program will be severely compromised.

- **May 2015**: Secretary Foxx announces USDOT's intent to accelerate Vehicle to Vehicle rulemaking activities with goal of issuing a regulatory proposal within 2015.