GlobalAutomakers

Aston Martin • Ferrari • Honda • Hyundai • Isuzu • Kia
Maserati • McLaren • Nissan • Subaru • Suzuki • Toyota

April 12, 2017

Docket Management Facility
U.S. Department of Transportation
1200 New Jersey Avenue SE.
West Building Ground Floor, Room W12–140
Washington, DC 20590–0001

Re: Docket No. NHTSA-2016-0126
Notice and Proposed Rulemaking and Request for Public Comment
Federal Motor Vehicle Safety Standards; V2V Communications

Enclosed are the comments of the Association of Global Automakers, Inc. ("Global Automakers") in response to NHTSA's January 12, 2017, notice of proposed rulemaking and request for public comment on vehicle-to-vehicle communications.

Sincerely,

Paul Scullion
Senior Manager, Vehicle Safety and Connected Automation

Enclosure

GlobalAutomakers

**COMMENTS OF THE ASSOCIATION OF GLOBAL AUTOMAKERS, INC.
IN RESPONSE TO NHTSA'S JANUARY 12, 2017,
NOTICE AND REQUEST FOR PUBLIC COMMENT
ON VEHICLE-TO-VEHICLE COMMUNICATIONS**

April 12, 2017

The Association of Global Automakers, Inc. ("Global Automakers")[1] appreciates the opportunity to provide its comments in response to the National Highway Traffic Safety Administration's (NHTSA) January 12, 2017, notice of proposed rulemaking on vehicle-to-vehicle (V2V) communications (the "NPRM").

Advancements in connected and automated vehicle technology present significant opportunities for saving lives, enhancing mobility, improving transportation efficiency, and reducing fuel consumption and associated emissions. Over the past several decades, our members have made tremendous strides in safety by improving vehicle crashworthiness. In recent years, automakers have also turned their attention toward the deployment of crash avoidance technologies to help prevent crashes from occurring in the first place. After over a decade of research and nearly a billion dollars of public and private investment, a major leap in crash avoidance technology now exists which will allow vehicles to communicate with each other in real-time, providing data to nearby vehicles in a safe and secure manner, to create greater situational awareness.

As manufacturers continue to invest significant resources in the development of crash avoidance technologies, it is important that policymakers provide a regulatory environment that will spur investment and innovation in this life-saving technology. Global Automakers believes the current proposal to promulgate a federal safety standard requiring dedicated short range communications (DSRC) technology will accomplish this goal. It will establish the interoperable standards necessary to enable all models and brands of automobiles to communicate with each other, creating a diverse and flexible safety ecosystem that would encourage innovators to develop, test and implement new connected and automated vehicle technologies and applications that could help save lives.

[1] The Association of Global Automakers represents the U.S. operations of international motor vehicle manufacturers, original equipment suppliers, and other automotive-related trade associations. Our members include American Honda Motor Co., Aston Martin Lagonda of North America, Inc., Ferrari North America, Inc., Hyundai Motor America, Isuzu Motors America, Inc., Kia Motors America, Inc., Maserati North America, Inc., McLaren Automotive Ltd., Nissan North America, Inc., Subaru of America, Inc., Suzuki Motor of America, Inc., and Toyota Motor North America, Inc. Global Automakers works with industry leaders, legislators, regulators, and other stakeholders in the United States to create public policies that improve motor vehicle safety, encourage technological innovation and protect our planet. Our goal is to foster an open and competitive automotive marketplace that encourages investment, job growth, and development of vehicles that can enhance Americans' quality of life. For more information, visit www.globalautomakers.org.

Global Automakers strongly agrees with NHTSA that the best way to ensure nationwide deployment of V2V safety communication technology across the vehicle fleet as soon as possible, is to require DSRC technology.

The NPRM proposes the establishment of a Federal Motor Vehicle Safety Standard (FMVSS) requiring V2V communications capability in all new light-duty vehicles. Global Automakers and its members advocated for and support this approach because we believe the potential benefits vastly exceed the costs and that these benefits are magnified if the full fleet is engaged. This is true whether measured as benefits to the public – lives saved and property damage avoided through reduction of light vehicle to light vehicle collisions – or the commercial benefit to industry – enabling a new safety application ecosystem in which OEMs (and others) can provide a broad range of safety applications. As explained herein, the proposed V2V FMVSS is necessary to establish a common industry framework for an interoperable safety application ecosystem upon which developers may be unleashed to deliver not only the benefits tallied in the NPRM – hundreds of billions of dollars of benefits based on only two safety applications – but other benefits, in such areas as vehicle-to-pedestrian (V2P), vehicle-to-infrastructure (V2I), etc., collective referred to as V2X.

Global Automakers strongly supports the agency's initiatives to reduce crashes by employing V2V communication technology. In particular, Global Automakers believes the issuance of an FMVSS using DSRC at 5.9 GHz is necessary to achieve widespread adoption of this important safety technology. After over a decade of research, development, and testing to define the operational environment and channel structure for supporting V2V safety services in the 5.9 GHz band, the continued availability of the dedicated 5.9 GHZ spectrum is a pre-requisite to the FMVSS. Without it, the FMVSS is not possible. Global Automakers also believes that regulatory flexibility to allow additional methods of communication as they develop, to the extent that they are interoperable with DSRC and meet a necessary minimum set of technical requirements, is appropriate.

DSRC safety technology has matured to the point where it is stable and ready for accelerated deployment today. Indeed, significant deployment of DSRC technology and infrastructure has already occurred as states and local governments have embraced the movement toward smart cities and smart highways. One OEM has already launched vehicles with DSRC.

The proposed rule is necessary to accelerate these deployment efforts and achieve the network effects and benefits possible only when DSRC is more fully deployed. However, to ensure realization of all of the numerous benefits of DSRC and to ensure the long-term sustainability of V2V communications, Global Automakers urges the agency to take the following steps in formulating its V2V final rule:

- Ensure the availability of all channels on the 5.9 GHz band spectrum for DSRC/V2V communications, as all channels will be needed for safety-related functions;

- Protect the 5.9 GHz band safety services from harmful interference; and
- Promote and strengthen the long-term security and privacy of V2V communications

I. Global Automakers Supports the Expeditious Implementation of V2V Communications Technology

Global Automakers' support for NHTSA's initiative to employ V2V communications technology to reduce crashes is based on the following considerations:

A. The importance of establishing V2V communications requirements as a safety standard

Global Automakers agrees with the discussion in the agency's preamble regarding the need for V2V communications capability and the potential it presents to achieve very substantial safety benefits. Global Automakers also agrees that nationwide adoption of V2V communication technology across all vehicle platforms is unlikely to be achieved without a FMVSS. Any other approach, including an "if equipped" standard, would not assure the widespread deployment and interoperability of the technology necessary to achieve the full potential of safety benefits.

The benefits estimates provided by NHTSA in the NPRM demonstrate the safety value of this technology, and that these benefits greatly exceed the costs, even though NHTSA's analysis is based on only two safety applications. Global Automakers views these benefits estimates as quite conservative because they do not reflect the potential for future applications that rely on V2V communication, or give consideration to enabled V2P, V2I and other V2X applications. Yet even using this conservative calculation, the rule yields hundreds of billions in economic benefits separate and apart from the potential safety benefits.

B. Establishing DSRC as the national standard for vehicle safety communications

NHTSA has demonstrated through its safety benefits assessment that significant benefits from V2V communications can be achieved if all vehicles are equipped with technology that enables communication with other vehicles. To achieve these benefits, however, all vehicle manufacturers need to embrace common standards for data and communications interoperability. Currently, DSRC technology is the only available communications technology capable of supporting the low-latency, high reliability, and highly mobile environment requirements of the V2V communication-based crash-imminent safety applications. Global Automakers believes that mandating DSRC technology will create a safety application ecosystem offering OEMs, equipment suppliers, software developers and others to

develop a variety of innovative safety applications. Additionally, establishing a national standard for the communications and data also enables safety services beyond just V2V communication-based safety; real-time communications with pedestrians and roadside infrastructure will enable additional safety-of-life applications, among others.

Furthermore, the specifications for DSRC are stable and ready for use today, and are currently being demonstrated in several early deployment sites around the country (e.g., New York City, Tampa Bay, Wyoming, Ann Arbor, Columbus, etc.).

Global Automakers supports the establishment of performance and interoperability requirements by NHTSA through a FMVSS, to ensure standardized communications between vehicles and other devices and technologies that leverage DSRC, as reflected in the agency's NPRM. This would help ensure broader interoperability of V2V and other V2X communication systems as they are deployed across the entire United States.

C. Standards for V2V Communications will enable aftermarket innovation

Global Automakers urges the agency to consider additional methods for allowing the benefits of V2V communication technology to be realized sooner. For example, including aftermarket V2V communication devices within the scope of the new standard, and thereby requiring them to meet the same operational and performance criteria as OEM-installed V2V communication devices, would help assure the compatibility of such devices with original equipment systems. This action could promote a more rapid adoption throughout the vehicle fleet as a whole by speeding deployment across existing vehicles. Once DSRC reaches critical mass, market forces and organic demand from consumers will drive aftermarket adoption and retrofitting of older vehicles.

D. The Evolution of technology

As technology evolves, Global Automakers agrees that regulation should not preclude future technologies that can meet all the V2V communication requirements, including interoperability with DSRC. Connected vehicles will ultimately be supported by multiple wireless platforms for a variety of different purposes. However, DSRC is the only currently available communication technology that meets the necessary requirements for V2V communication-based safety. In the event other similarly capable communication technologies arise, NHTSA should established requirements to ensure interoperability and full performance between such future technologies and DSRC.

E. DSRC as a complement to Advanced Driver Assistance Systems (ADAS) and Automated Vehicle (AV) capabilities

V2V communication is complementary to vehicle-resident ADAS sensor technologies for supporting safety applications. Even as vehicle-resident technologies continue to improve, V2V communications will remain a complementary rather than competing safety technology for more robust and innovative safety solutions. For example, DSRC safety messaging can address crash scenarios such as Intersection Movement Assist and Left-turn Assist that cannot be supported adequately with on-board sensors such as LIDAR, radar, and cameras.

Moreover, V2V will support higher levels of vehicle automation, and will offer engineers and designers another wireless platform, with its own unique characteristics – such as the ability to operate in rural areas where cellular wireless signals and infrastructure may not be present. The fusion of V2V communication technology along with other vehicle-resident sensor technologies, advances the further development of vehicle automation systems and capabilities, ultimately leading to fully self-driving vehicles. V2V communications could be particularly helpful in the near future where highly automated vehicles will operate on the same roads and highways as conventional vehicles. For example, potential crashes between traditional and autonomous vehicles could be avoided if both vehicles are equipped with DSRC. Although difficult to estimate, the upper end of this range of benefits should also consider the long-term potential of this technology to enhance automated driving capabilities.

F. Establishing Channel 172 as a dedicated channel for safety

Global Automakers believes that the full safety benefits of the DSRC technology requires the availability of all channels across the 5.9 GHz band, and it also strongly favors channel 172, specifically, for supporting V2V basic safety message (BSM) transmissions. Several years of public/private research have gone into defining and establishing a common architecture and set of standards for supporting V2V communications for safety. This includes identifying channel 172 as the optimal channel for performance. Channel 172 is ideally situated to have a guard band between it and UNII devices operating below it, to have only one adjacent DSRC channel, and to have the maximum spectral distance between it and the high-power public safety channel at channel 184. High power transmissions interfere with DSRC reception on other channels over a wider geographic range (i.e., have a larger interference range) than do low power transmissions. But, the out-of-band energy is attenuated more for frequencies farther from the occupied channel than for nearer frequencies. So, for a high power transmission on channel 184, the interference range on channel 172 is smaller than on channels closer to channel 184. No other single channel in the 5.9 GHz band is better suited for ensuring a clean operational environment for ensuring reliable transmission of the safety messages. To switch this performance channel to a different channel at this point (as suggested by some parties)

would incur several years of additional research and testing to ensure V2V communication-based safety needs could still be met.

Global Automakers disagrees on several counts with proposals before the FCC that suggest moving the V2V BSM transmissions from channel 172 to one of the upper 3 channels in the band will produce a better, interference free environment for safety (the re-channelization approach):

- There is no empirical data to support this operational claim or that the V2V safety communications can even operate effectively under such an approach,
- The number of potential safety applications that could be made available would likely need to be reduced, and the opportunity to innovate and provide increased safety applications in future would also be severely constrained due to the reduced number of safety channels resulting from such a proposal, and
- To implement the re-channelization approach would require several years of re-working and a resulting delay in achieving the safety benefits.

The re-work, is not just about moving the BSM to a different channel, but rather, the entire reassignment of applications to channels that would be required by re-channelization. That reassignment means that BSMs would operate in a different interference environment than they do now, with respect to other DSRC traffic on the same channel, other DSRC traffic on immediately adjacent channels, U-NII-4 devices operating up to 5.895 GHz, and other licensed transmitters (e.g. Fixed Satellite Systems) in and above the 5.9 GHz band. Reassignment would also require industry to:

- Develop a new consensus on assignment (e.g., which channel for BSMs and what other traffic goes in the same/different channels),
- Write new standards,
- Possibly redesign equipment (e.g., if interference-limiting filters need to be tightened), and
- Conduct sufficient laboratory and real world testing of safety applications.

This could add up to several years of additional effort prior to ensuring that safety applications can be deployed in a responsible manner. Global Automakers supports spectrum sharing, but it must be done in a proven manner that does not interfere with the current safety spectrum channel plan.

G. Accelerating V2V communication capability expeditiously and broadly across vehicles and aftermarket equipment.

Global Automakers supports additional regulatory initiatives to incentivize other vehicle types to include V2V communications capability for greater safety. NHTSA has included in its planning documents the concept of including heavy trucks within the mandate. We support this expansion,

which should be pursued expeditiously by the agency. While we recognize that technical issues remain regarding such vehicles (particularly for extended vehicles such as semis), Global Automakers requests that the agency articulate a more detailed plan for including heavy trucks within the scope of the V2V communication standard.

H. Ensuring system security.

Expeditious implementation of a sustainable "back office" security system to maintain the integrity of communications is a critical step in the implementation of V2V communication. The fundamental necessities of the SCMS should be in place for deployment, like issuing pseudonym certificates, but not all features are necessary at the beginning, such as misbehavior detection reporting and CRL distribution.

II. Our Concerns with the Agency Proposal

A. NHTSA should not limit safety to one channel.

The NPRM contains a highly unfortunate and extremely misleading statement regarding the need for safety channels within the band. Beginning on page 3885 of the preamble and continuing onto page 3894 and section 5.3.2 of the proposed regulations, the agency uses the term "safety-critical" to refer to the communication of basic safety messages on channel 172 only. In contrast, communications on the remaining channels of the band are referred to as "non-safety-critical." While Global Automakers doubts that the agency intended to diminish the safety significance of the latter channels, the use of the "non-safety-critical" descriptor must be considered in the context of the ongoing dispute before the FCC, which could lead to the misuse of these statements.

Global Automakers strongly disagrees with any suggestion that seven channels are not needed to support currently identified safety communications needs. First, channel 184 is clearly identified as a Public Safety Channel. Second, the recently published SAE J2945/9 "Vulnerable Road User Safety Message Minimum Performance Requirements" standard specifies use of channel 176 for Personal Safety Message transmissions to protect pedestrians, bicyclists, and other vulnerable road users. Third, the SAE J2945/0 "Systems Engineering Process Guidance for J2945/x Documents and Common Design Concepts" standard now in ballot for publication recommends that all seven channels be available for safety communication.

This usage plan is consistent with long-standing FCC DSRC rules, which have never identified any channel as "non-safety." The "safety" term should also be considered more broadly than just crash-imminent scenarios. Safety should also encompass better traffic management that lessens the

likelihood of a crash from happening, for example, notification of icy road conditions or of a disabled vehicle ahead.

Moreover, consistent with Secretary Chao's statements making transportation safety the Department's top priority, there should be an allowance for innovation and growth in the 5.9 GHz safety spectrum band to support vehicle-to-vehicle, vehicle-to-infrastructure, and vehicle-to-pedestrian communications.

B. The security infrastructure sustainability model must be clearly defined.

While there is a fully functioning security system in place today to support pilot deployments and early adopters, Global Automakers urges DOT to define the long-term pathway towards a scalable, nationwide, and sustainable security solution. Global Automakers stands ready to work with DOT and the industry to make this happen and does not believe that this concern should delay promulgation of the V2V FMVSS. As a first step, Global Automakers would like to better understand the full extent of current DOT research activities in this area, including the work currently underway at CAMP.

OEMs are concerned that unless a sustainable SCMS can be established, their investment in V2V safety communications and customer access to vehicle features could be at considerable risk.

Global Automakers strongly supports the current PKI model for the SCMS. The alternative approaches of "Performance-Based only" and "No Message Authentication" are not supported due to their vulnerability to manipulation and abuse.

Although misbehavior detection is not considered mature enough at this point to be required, reporting could be considered as an optional feature.

Global Automakers agrees that the Internet Corporation for Assigned Names and Numbers (ICANN) serves as an appropriate model for the SCMS manager function as identified by the VII Consortium in a report it prepared for the ITS JPO in 2015.

C. NHTSA/DOT must engage with the FCC on potential harmful interference testing and assessment.

The need for safety spectrum that is completely free from all forms of harmful interference is critical to the success of DSRC. Global Automakers has a number of concerns if NHTSA were to move forward with this rulemaking with the 5.9 GHz spectrum not available for the safety and traffic efficiency applications for which it was originally intended. The FCC is currently engaged in a regulatory proceeding where it is considering opening the 5.9 GHz band to widespread Unlicensed National Information Infrastructure ("U-NII") use of the same Wi-Fi spectrum allocated to V2V communication.

U-NII use, by its very definition, is not licensed by the FCC and is, therefore, subject to little regulatory oversight. Such use could cause harmful co-channel, adjacent channel, and out-of-band interference to DSRC services on a regular basis. This interference would degrade DSRC V2V and V2I safety communications, making it impossible to confidently develop and deploy new latency-sensitive safety and other applications requiring high spectrum availability, and call into question the viability of NHTSA's and the auto industry's shared vision for safer, connected vehicles. Moreover, the harm that such interference could cause to the users of in-vehicle safety systems cannot be cured by any subsequent regulatory efforts to fix the problem. It is critical that DOT remains fully engaged in this FCC proceeding in order to maintain the quality-of-service of the life-saving potential of V2V communication technology.

U-NII users argue that they can share the 5.9 GHz band without causing harmful interference to DSRC, and they have been working for the past year to present the incumbents with a viable sharing proposal. Global Automakers has participated in an ongoing dialog with advocates of expanded 5.9 GHz U-NII use with the hope of achieving assurances that, through bench and field testing and analysis and additional public consultation, the interference issues discussed herein can be resolved. Global Automakers stands ready to work with the FCC/DOT and other stakeholders as this proceeding evolves to address these concerns, but it is important that the FCC take no action with respect to the allocated DSRC safety spectrum that could jeopardize operation of safety applications in this band.

III. Other Key Considerations

The following section is intended to provide high-level overview of some of the key factors that should be considered as NHTSA develops its final rule.

A. Safety Applications

Global Automakers agrees that issuing a FMVSS for V2V safety communications provides a tremendous opportunity for advancing vehicle safety benefits. While NHTSA's current approach is to forgo inclusion of specific applications in this proposed regulation, Global Automakers believes the FMVSS will establish the framework for a safety application ecosystem that will attract significant private sector investment and innovation towards the development of new safety applications and services. Safety applications that are tied to V2V as well as other V2X communications should be expected to evolve rapidly once the base V2V communication technology is in place. As such, we agree with issuing the FMVSS without specific safety applications being included.

B. Over-the-Air (OTA) Security and Software Updates

While Global Automakers is generally supportive of the concept of OTA as a mechanism for software updates, this particular method should not be explicitly specified in the regulation. There are numerous complexities and implications of such technology that need to be carefully considered first. NHTSA should provide flexibility by specifying requirements for updating the system without specific approaches or technologies. Nevertheless, as with numerous electronic devices, we believe implementation of software updates should be allowed to occur through direct action by the manufacturer.

Depending on the nature of the update, requirements may differ. For example, application software updates that may not be critical to the operation of the system may have one set of updating requirements. For security software updates, such as the need for additional certificates, the vehicle would need to receive such updates in a timely manner or risk being removed from the safety network, at which point some type of malfunction indicator may need to be provided to the consumer. Still, the business models and nature by which these updates occur could vary and should not be prematurely constrained to a single method.

C. Consumer Acceptance

Global Automakers believes consumer acceptance is paramount to the success of any new safety technology and supports a strong public education initiative to help make consumers aware of this new crash avoidance technology.

D. Privacy

Global Automakers commends NHTSA in its approach to privacy and the agency's commitment to working with stakeholders and partners to develop the technical and policy controls necessary to address the potential privacy impacts of V2V. Consumer trust is an essential component for the acceptance and adoption of any new technology, and the safeguards proposed by the agency will help protect users' Personally Identifiable Information (PII) and reduce any potential privacy concerns that might exist. By adopting an approach of "Privacy by Design," the V2V system facilitates both secure and anonymous transmission while helping to minimize any residual privacy risks to consumers.

We support NHTSA's Privacy Statement, as set forth in Appendix A of the NPRM. Global Automakers agrees with the agency's general conclusion that V2V communication technology does not present a significant privacy risk to individuals. As noted by the agency, V2V communication technology will not collect or store personally identifiable information, nor is it realistic that it will store sufficient GPS path location information to facilitate tracking of a vehicle. For these reasons, Global Automakers does not believe that privacy concerns should be an impediment to the agency's pursuit of a mandate for V2V communication systems.

However, the importance of privacy to the public acceptance of V2V communication technology should not be underestimated. The members of Global Automakers take the privacy of customers very seriously. We believe that strong consumer data privacy protections are essential to maintaining customers' trust – as demonstrated through a November, 2014, auto industry commitment to "Consumer Privacy Protection Principles for Vehicle Technologies and Services"[2]. It is important that a transparent, easy-to-understand and meaningful disclosure be provided to consumers and we recommend that NHTSA work to further simplify the privacy statement prior to issuing its final rule.

E. Additional cybersecurity measures

Ensuring the security of V2V communications is essential and needs to be an ongoing point of emphasis for the agency and industry stakeholders. We support the agency's basic approach as set forth in the NPRM for assuring the security of V2V communications. Global Automakers concurs in the agency's statement that manufacturers should take additional security steps such as isolation of safety-critical control systems, adopting intrusion detection measures, and implementing real-time response methods. However, it is premature to require other cybersecurity requirements in the regulation.

For example, on the issue of firewalls, NHTSA should not specify specific design constraints. Security is an important concern, but also an area of rapid innovation. Manufacturers will apply appropriate measures based on risk analyses of their specific products and technology implementation. Specific means of segregation and isolation may vary among manufacturers based on a number of factors.

While Global Automakers believes it is critical for the federal government to take a leadership role in standing up the security management system (and to provide the necessary oversight to ensure trust and interoperability in the V2V ecosystem), the automobile industry currently is taking voluntary steps to mitigate vehicle cybersecurity issues (within each vehicle where the internal systems are uniquely designed to support the needs in each product). On July 1, 2014, the industry announced an initial effort to address vehicle-related cybersecurity concerns. Global Automakers and the Alliance of Automobile Manufacturers agreed to establish the Information Sharing and Analysis Center (ISAC) to facilitate the collection and sharing of information about existing or potential cyber-related threats and vulnerabilities in motor vehicle electronics or associated in-vehicle networks. The Auto ISAC is now fully operational.

[2] See "Consumer Privacy Protection Principles for Vehicle Technologies and Services" http://globalautomakers.org/system/files/document/attachments/Global%27s%20and%20the%20Alliance%27s%20FTC%20Letter%20Committment%20and%20Privacy%20Principles%20%282%29.pdf .

F. Implementation Timing

Global Automakers supports an expeditious implementation of the V2V FMVSS. Obviously, manufacturers cannot begin detailed compliance planning until they know exactly what their compliance obligations will be. At this point, some important issues related to the standard remain to be resolved. We hope to work closely with NHTSA to address these issues as the agency moves toward issuance of a final rule. A critical issue that must be resolved before we can begin planning compliance with the standard is completion of the FCC spectrum sharing proceeding. As noted above, a decision by the FCC to take a re-channelization approach for spectrum sharing could significantly delay V2V implementation and associated safety benefits, due to the need for the auto industry and DOT to re-align the research and testing if a different channel structure is mandated. Another key issue is developing a viable, long-term pathway for implementation of the SCMS. Once these and other details are resolved, manufacturers will have a firm basis on which to move forward with the planning needed to comply with the V2V standard.

G. Specific Comments on NHTSA's Proposed Regulatory Text

Global Automakers provides comments in response to the proposed regulatory text requirements in an appendix document accompanying this submission.

GlobalAutomakers

Appendix – Specific Comments on Proposed Regulatory Text

Global Automakers provides the following comments on the specific regulatory requirements proposed in the NPRM. As a general matter, we believe it is important that NHTSA reference SAE J2945/1 as part of the final rule. As noted below, there are several instances where the agency has reworded or reframed the standards language such that it could change the intent or interpretation of established standards.

S3 Application.
This standard applies to new passenger cars, multipurpose passenger vehicles, trucks, and buses with a gross vehicle weight rating of 10,000 pounds (4,536 kilograms) or less.

> Comment: Propose to expand the scope by eliminating GVWR 10,000lbs or less, to include heavy trucks. What is NHTSA's plan for addressing heavy vehicles? Originally, the plan was for the HV rule to follow the LV rule by 1 year.

S5.1 Content.
Each BSM must contain the following elements, except as provided in S5.1.7.:

> Comment: We believe the reference to S5.1.7 is incorrect and should be corrected to S5.1.9.

S5.1.3 Location.
As part of each BSM, a DSRC device must transmit:
S5.1.3.1 Longitudinal and lateral location within 1.5 meters of the actual position at a Horizontal Dilution of Precision (HDOP) smaller than 5 within the 1 sigma absolute error; and
S5.1.3.2 Elevation location within 3 meters of the actual position at a Horizontal Dilution of Precision (HDOP) smaller than 5 within the 1 sigma absolute error.

> Comment: The HDOP requirement and the VDOP requirement are stricter than that specified in SAEJ2945/1MAR2016, which states an HDOP of 1.5 and a VDOP of 3. There needs to be an explanation for why the need for an HDOP of 5 and a VDOP of 5. The preamble states "In order for vehicles to accurately communicate their position in a basic safety message to each other, all vehicles need to agree to a single point on the vehicle as the reference point". We request to specify "vehicle reference point" in the regulatory text, as it appears in SAE J2945/1.

S5.1.4.3 Acceleration.
Horizontal (longitudinal and lateral) acceleration must be reported accurately to 0.3 m/s2, and vertical acceleration must be reported accurately to 1 m/s2.

Comment: Clarification is needed as to how the vertical requirement contributes to safety. This may impose a requirement for additional sensors to accurately measure vertical acceleration.

S5.1.4.4 Yaw rate.
Yaw rate must be reported accurately to 0.5 degrees/ second.

Comment: We recommend adding an open sky condition, in order to allow GNSS-aided yaw rate bias estimation.

S5.1.5.1.2 Path History points should be incorporated into the Path History data frame such that the perpendicular distance between any point on the vehicle path and the line connecting two consecutive PH points shall be less than 1 m.

Comment: Because there is variation in GNSS, we request to specify "in consideration of the variation in GNSS" in the regulatory text.

S5.1.5.1.3 Minimum number of Path History points vehicles should report the minimum number of points so that the represented Path History distance (i.e., the distance between the first and last Path History point) is at least 300 m and no more than 310 m, unless initially there is less than 300 m of Path History. If the number of Path History points needed to meet both the error and distance requirements stated above exceeds the maximum allowable number of points (23), the Path History data frame shall be populated with only the 23 most recent points from the computed set of points.

Comment: We recommend the maximum path history be increased to 450m for EEBL performance.

S5.1.5.2.2 After a transition from the original constant radius (R1) to the target constant radius (R2), the subsystem shall repopulate the Path Prediction data frame within four seconds under the maximum allowable error bound defined above.

Comment: Requirements are unnecessarily stricter compared to S5.1.4. S5.1.5.2.1/S5.1.5.2.2 should be at least consistent with the S5.1.4 requirement. Also, the situation of transition from R1 to R2 is unclear. Therefore, we request NHTSA provide additional information regarding the definition of R1 and R2.

S5.1.5.3.1 The Exterior Lights data element.

Comment: Global Automakers agrees with mandating turn signal and hazard signals. Other lights, as indicated by the language, “if available” are not considered to be mandatory.

In addition, to clarify that there is no need to detect the burned-out bulb, we request NHTSA specify "no need to detect the burned-out bulb" in the regulatory text.

S5.1.5.4 Event flags.

Comment: Elements considered optional in the SAE standards should also be treated as optional in the regulation. Additionally, many of the event flags are poorly defined at this time and thus inappropriate for inclusion as required elements.

S5.1.6 Vehicle-based motion indicators. As part of each BSM, a DSRC device must transmit transmission state and steering wheel angle.

Comment: Steering wheel angle should be optional since it is unclear why it is necessary. And without the steering ratio, steering wheel angle data is of little value.

S5.1.6.1 Transmission state must be reported as either ''neutral,'' ''reverse,'' or ''forward'' for any forward gear.

Comment: To clarify the transmission position, we request to align the requirement with SAE J2735 para.7.201.

S5.1.7 Vehicle size. Vehicle size must be reported accurately to 0.2 meters of the vehicle's length and width.

Comment: The requirement should be based on the vehicle's size at the time of manufacture.

S5.2 Initialization time. A DSRC device must begin transmitting the BSM within 2 seconds after the V2V communication device power is initiated.

Comment: We recommend that NHTSA reconsider 2 seconds, as it is unlikely that the driver encounters scenarios for which IMA/LTA activation is needed after 2-sec of engine ignition turned on. Further clarification of the pre-conditions needs to be included. We suggest including additional qualifying wording, as called out in the preamble, to further clarify this requirement. We recommend adding the test procedure for initialization time which mentioned in 82FR3905.

While certain situations are not unlikely (e.g., pulling out of a driveway), the initialization time to acquire GPS needs to be considered.

S5.3.2 Transmission channel. A DSRC device must transmit the BSM on Channel 172, as allocated for "public safety applications involving safety of life and property" in 47 C.F.R part 90, subpart M. All non-safety-critical communications will occur on the remaining channels allocated for DSRC in subpart M.

Comment: While the BSM is the most essential element, it is not the only safety critical function. Additional channels are needed to support other safety related functions. Furthermore, "non-safety-critical communications" needs to be defined.

S5.3.3 Transmission data rate. A DSRC device must transmit the BSM at a bit rate of 6 Mbps.

Comment: Global Automakers agrees that 6 Mbps is the appropriate data rate.

S5.3.4 Transmission staggering timing. A DSRC device must transmit the BSM every 100ms +/1 a random value between 0 and 5ms.

Comment: Correction to wording: "100ms +/1" should read "100ms +/- 1 ms"

S5.4 Signing the BSM. [Reserved for message signature requirement if needed]

Comment: Any SCMS requirements should be consistent with the CAMP work and should be proposed before the final rule is issued.

S5.4.1 Rotating certificates. [Reserved for rotating certificate requirement if needed]

Comment: Any SCMS requirements should be consistent with the CAMP work and should be proposed before the final rule is issued.

S5.5.2.3 If the channel busy ratio is above 80% (Umax) and the transmission is based on Max_Trans_Time, then the BSM must be transmitted at minimum power (10 dBm, Pmin);

Comment: Congestion control algorithm's power is not well defined: dBm is measured where? (S5.5.2.3)

In addition, in the case when the transmission power is low, transmission range cannot comply with S5.3.1. We request to specify, "S5.3.1 does not apply to this requirement" in the regulatory text.

S5.5.2.4 If the channel busy ratio is between (c) and (b), then the BSM must be transmitted at a power based on a linear function that proportionally reduces the transmission power based on the channel busy ratio value during the previous transmission (U(k-1)) and the previous transmission power (P(k-1). Where the transmitted power (P(k)) is defined by:

$$P_K = P_{k-1} + 0.5\left(P_{\max} - \left(\frac{P_{max} - P_{\min}}{U_{max} - U_{min}}\right) \times (U_{k-1} - U_{min}) \right] - P_{k-1})$$

Comment: S5.5.2.3/S5.5.2.4: It is impossible to meet S5.3.1 (Transmission range) with dynamic transmission reduction. In the case of when the transmission power is low, transmission range cannot comply with S5.3.1. We request to specify, "S5.3.1 does not apply to this requirement" in the regulatory text.

S5.6.1.1 If a DSRC device detects a malfunctioning sensor which may cause misbehavior, the device must:
(a) Either transmit the BSM with the affected elements set to "Unavailable" if relevant standards allow the element to be set to "Unavailable"; or
(b) Cease BSM transmission if relevant standards do not allow the element to be set to "Unavailable."
If either (a) or (b) is detected, [Reserved for requirement to report malfunctions if needed]

Comment: There should be no requirement to report malfunctioning sensors to anyone outside the vehicle. Malfunctioning sensors should be dealt with internally. Upon detection of a sensor that is used as input to the BSM, the system should stop transmitting and inform the driver that the vehicle is in need of service.

S5.6.1.2 [Reserved for requirement to report physical tampering]

Comment: Reporting physical tampering goes beyond the requirements of FIPS L3 and even L4. This may be an unreasonable expectation for the system, driving up complexity and costs. Global Automakers also suggests that physical tampering which disables the system should void any warranty and liability, similar to as if airbags and ABS were disabled. If NHTSA decides to require this, they should issue proposed language before the final rule is issued. In addition, we recommend aligning and referencing SAE J2945/1 (FIPS-140-2 Level 2)

S5.6.2 Checking and reporting on the plausibility of incoming BSMs.

Comment: Misbehavior detection is not considered mature enough at this point to be required. Reporting could be considered as an optional feature. If NHTSA decides to require this, they should propose language before a final rule is issued.

S5.6.2.1 The preliminary plausibility check must identify as an implausible message any BSM for which the components of the vehicle dynamic state (position, speed, acceleration, and yaw rate) are outside the following values:
(a)-(e)
Additionally, a BSM must be identified as implausible if values within the BSM are not internally consistent given the formula V2 = ac/(Y´)2.

Comment:
We request clarification of the following regulatory text. "formula V2 = ac/(Y′)2": Definition of each symbol (V, ac, Y') should be clarified.

S5.6.2.2 A DSRC device must be able to perform the plausibility checks described in S5.6.2.1 on at least 5,500 BSMs per second.

Comment: It would be an extremely rare case in which so many vehicles would be around to require such a high capacity. There needs to be clarification of what kind of situation is assumed.

S5.6.2.3 [Reserved for requirement to report any failed plausibility check]

Comment: Any misbehavior detection requirements should be consistent with the CAMP work. If NHTSA decides to require this, they should propose language before a final rule is issued. The misbehavior detection requirement should account for practical positioning accuracy concerns to prevent unnecessary/false reporting.

S5.6.2.4 A DSRC device must support the detection of other devices which are suspected of misbehaving, and at a minimum detect the following types of misbehavior:
(a) Proximity Plausibility: Instances are detected of two or more vehicles, either partially or wholly, occupying the same physical space based on the reported GPS positions.

Comment: The term "GNSS" should be used instead of "GPS" (align with other requirements). Also, detecting misbehavior should be based on realistic GPS accuracy. The requirement is

based on errors in vehicles positions, which could occur in real world with no intention of misbehavior. How to determine misbehavior should be up to OEMs.

S5.6.3 [Reserved for requirements for sending misbehavior reports]

Comment: Any misbehavior detection requirements should be consistent with the CAMP work.

Misbehavior detection is not considered mature enough at this point to be required. Reporting could be considered as an optional feature. If NHTSA decides to require this, they should propose language before a final rule is issued.

S5.7 Indicating a malfunction.

Comment: Reporting system failures is not yet based on a good standard for definition of different kinds of failures (S5.7.1). If NHTSA decides to include the requirement, we request that NHTSA modify (e) "BSM transceiver device failures" instead of "An inability to transmit or receive BSMs" because (1) it is difficult to detect an inability to transmit or receive BSMs at the antenna, (2) HV cannot determine whether the BSM was not transmitted from RV or RV does not exist, and (3) aligned with "(c) On-board memory failures" and "(d) GPS receiver failures", and to delete (f) because it is the same as (a).

S5.7.3 Owners' information for the device (or vehicle, if the DSRC device is installed as original equipment) must clearly describe the malfunction indication, potential causes, and when the device must be taken in for service (as needed).

Comment: It is not necessary to provide detailed information (such as causes) with customers.

S5.8 [Reserved for requirement to communicate with the SCMS if needed]

Comment: Any misbehavior detection requirements should be consistent with the CAMP work and should be proposed for comment before the final rule is issued.

S5.9 Communicating about and obtaining software and security updates.

Comment: This requirement is considered to be out of scope for this FMVSS.

S5.10 [Reserved for hardware protection requirement]

Comment: Global Automakers supports the CAMP recommendation of FIPS 140-2 level 2 as called out in the SAE J2945/1 requirement. FIPS 140-2 Level 3 should be an optional requirement.

S6.2 Road test surface.

Comment: Yes, manufactures could use identified evaluation sites as reference and conduct evaluation in an appropriate manner.

S7.1 Pre-test/Inspection.
S7.1.2.4 Measure the V2V System GNSS Receiver Antenna.

Comment: From context, we interpret this measurement is not for performance, but for location/coordinates. If so, we request to specify, "Measure the V2V System GNSS Receiver Antenna coordinates" in the regulatory text.

S7.2 Static Performance Test Procedure:

Comment: As a general matter, Global Automakers has a number of concerns surrounding the Static Performance Test Procedures defined in S7.2. In several instances, the procedures are impractical and lack the definition of important elements, such as the properties of the packet capture device. Global Automakers recommends that the procedure is revised to an EIRP type test conducted at an antenna chamber, or similar facility, or a close-range field-test with an appropriately calibrated (e.g., attenuated transmission line-based receiver) DSRC capture device. In addition, NHTSA must provide additional specification on the “packet capture device” that is defined in the proposed rulemaking.

The static performance test procedures in S7.2.1-S7.2.9 should be aligned with SAE J2945/1 S6.4.1.

S7.2.2 Two dimensional range: Position a DSRC packet capture device directly in front of the test vehicle with the following characteristics:
S7.2.3 Upward elevation range: Position a DSRC packet capture device at any point along the following line.
S7.2.4 Downward elevation range: Position a DSRC packet capture device at any point along the following line.

Comment: S7.2.2/S7.2.3/S7.2.4: Detailed specs (antenna itself, its cable and loss, polarization and so on) of the antenna for a DSRC packet capture device should be specified.

S7.2.10.1 Using the transmission blocking water filled plastic blanket that will hold one gallon of water with a water width of 1 inch, cover the test vehicle GPS antenna to prevent it from receiving a valid GNSS signal.

Comment: Use industry best practices to prevent reception.

S7.2.10.2 Connect GPS signal generator to the test vehicle OBE.

Comment: Need to clarify GPS signal generator device and signal data contents.

S7.2.10.7 Retrieve and process the log files to determine compliance with the positional accuracy requirements

Comment: Need to clarify signal data to be used for GPS signal generator and benchmark data.

S7.3 Simulated Performance Tests.
S7.3.2.1 The device is 1.5 m above the test surface;

Comment: Antenna height should be defined. We request to specify "The antenna of the device is 1.5 m above the test surface" in the regulatory text.

S7.3.5.4 Using the reference OBE device, transmit simulated misbehaving BSMs.

Comment: We request more detailed information about simulated misbehaving BSMs which information is tampered.

S7.4 Dynamic Performance Test Procedure
S7.4.1 Configure the test vehicle to send BSMs representing the best estimate of the BSM data parameters.

Comment: Request for suggested sites for testing, (e.g. test courses). The definition of the best estimate of the BSM data parameters is unclear. We request to clarify the definition.

S7.4.2 Configure the test vehicle to send ground truth data (position, speed, heading, acceleration, yaw rate, and time) from independent sensors mounted on the test vehicle via non-DSRC wireless link.

Comment: The definition of the ground truth data is unclear. We request to clarify the definition.

S7.4.4 Configure an RSE on the test track to receive the test vehicles' ground truth data.

Comment: It is unknown why RSE is necessary. We request additional information.

S7.4.5.7 Shift the transmission to ''Drive'' and accelerate the vehicle to 15 mph +/-mph.

Comment: The meaning of 15 mph +/- mph is unclear. We request additional tolerance information.

S7.4.5.8 Proceed up an incline with a minimum rise of ? ft.

Comment: The meaning of minimum rise is unclear. We request additional information.

S7.4.5.13 Cycle the ignition.

Comment: It is unclear which information should be checked with IG – ONOFF. We request additional information.

S7.4.6.10 [Reserved for requirement to retrieve and process the log files to determine if a Misbehavior Report was sent to the SCMS]

Comment: This should be coordinated with CAMP work. Should be proposed for comment before final rule is issued.

S7.4.7 [Reserved for Misbehavior Detection Signature Failure testing requirement]

Comment: This should be coordinated with CAMP work. Should be proposed for comment before final rule is issued.

S8 Phase-in schedule.

Comment: Addressed in comments above.

S9 Interoperable technology.

Comment: Agree to allow interoperable technology as long as it meets specification and not delay deployment of the system. However, much more study of alternatives is necessary before serious consideration can be given to other technologies. A device is not truly interoperable if

it is not speaking the same language as DSRC. The communication protocol would need to be compatible.

If any other V2V communication technology (than DSRC) is to operate, it should operate outside the 5.9 GHz band to avoid any risk of interference and performance degradation of both technologies.

S9.1.3.3 [Reserved for test procedures on receiving BSMs from a DSRC test device]

Comment: Testing should consist of positive and negative testing, where positive testing includes messages derived from many or all makers of equipment, and where negative testing includes all possible failure scenarios: bad signature components, bad certificate at any point in the certificate chain, or expired certificate in any point in the certificate chain. The devices should be required to behave properly in every case.