GlobalAutomakers

March 1, 2019

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 DOT-OST-2018-0210
Request for comment on the impact of developments in communications technologies that could be associated with V2X and the role of the Department of Transportation in encouraging the integration of V2X.

Enclosed are the comments of the Association of Global Automakers, Inc., with regard to the Department of Transportation's December 26, 2018, notice of request for comment on developments in core aspects of the communication technologies that could be associated with V2X, how these how these developments impact both V2X in general, and the Department's role in encouraging the integration of V2X.

Sincerely,

Paul Scullion
Senior Manager, Vehicle Safety and Connected Automation

Enclosure

GlobalAutomakers

COMMENTS OF THE ASSOCIATION OF GLOBAL AUTOMAKERS, INC., REGARDING THE DEPARTMENT OF TRANSPORTATION'S DECEMBER 26, 2018 NOTICE AND REQUEST FOR COMMENT ON V2X TECHNOLOGY AND THE ROLE OF THE DEPARTMENT IN ENCOURAGING THE INTEGRATION OF V2X

The Association of Global Automakers, Inc., ("Global Automakers")[1] appreciates the opportunity to provide comments in response to the Department of Transportation's ("DOT") December 26, 2018, request for comment (RFC) on V2X communications, and commend the Department for its continued engagement on this important issue.

1. Introduction

Advancements in connected and automated vehicle technology provide significant opportunities for saving lives, enhancing mobility, improving transportation efficiency, and reducing fuel consumption. After significant research and development, and nearly a billion dollars of public and private investment, vehicle-to-vehicle ("V2V") technology has evolved to allow vehicles to communicate with each other in real-time, and in a safe and secure manner. Connected vehicle technology also allows vehicles to communicate with infrastructure ("V2I") and the surrounding environment (collectively referred to as "V2X") to provide greater situational awareness and improved roadway safety. The benefits of V2X communications can operate within a mixed fleet environment providing safety benefits for conventional vehicles while also enhancing the operation of highly automated vehicles through connected automation.

The DOT Automated Vehicles 3.0 Guidance on *Preparing for the Future of Automation* ("AV 3.0") identifies V2X as a technology that is expected to enhance the benefits of automation at all levels, but further states that it should not be and realistically cannot be a precondition to the deployment of automated vehicles. While we agree with this statement to the extent that V2X need not be a precursor to automation, we believe it is critical to underscore the importance of low-latency V2X communications as an integral component of a modern twenty-first century transportation system. With increased demand for mobility, whether it be for the movement of people, goods, or services, these technologies will help support and enhance the utility of infrastructure, providing a solid foundation that will support continued economic growth in the economy. It is therefore essential that DOT continue to support the development of a policy framework that provides certainty and allows for the testing and deployment of V2X technology, while ensuring a measured, data-driven approach.

We are at a critical juncture in realizing the benefits of V2X technology, yet significant policy uncertainty exists despite recent commitments from a number of automakers to deploy communications technology. As discussed in more detail below, this uncertainty is the consequence of several factors. These include the ongoing policy debate within the FCC with respect to the future use of the 5.9GHz spectrum for transportation, which has slowed deployment due to the potential for all or part of the spectrum to be opened for unlicensed use. In

[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. Global Automakers' mission is to educate and advocate for policies that help foster a vibrant, growing, free and open U.S. auto industry for all stakeholders. The Association collaborates with industry leaders, legislators, regulators, and other stakeholders in Washington, DC and 50 state capitals to create the kind of public policy that promotes innovation, vehicle safety and environmental responsibility. Our members' account for 40 percent of all U.S. production. International automakers account for 47 percent of all U.S. sales of passenger vehicles and light trucks. For more information, visit www.globalautomakers.org.

addition, the emergence of additional V2X technologies combined with the DOT decision to adopt a technology neutral approach has led to a number of questions regarding interoperability and the need to ensure that vehicles equipped with V2X can be capable of communicating both with other vehicles on the roadway, as well as the surrounding infrastructure.

In addition, the imposition of tariffs on steel and aluminum, the threat of tariffs on automotive trade, and ongoing discussions within the Administration over export controls create further uncertainty and threaten to undermine the development and deployment of this important technology in the United States. These tariffs, and the retaliatory measures they would certainly provoke, would be devastating to American technological leadership in an important and emerging sector. The success of V2X communications heavily depends on investment and deployment, so government support and engagement is critical as we move forward. We urge the Department to view the impact of tariffs on American innovation and technology leadership in this broader context and communicate these concerns through appropriate channels to ensure that the goals of DOT in advancing connected automation in the United States are achieved.

Global Automakers believes there is a strong need for DOT leadership in the near-term so that we can collectively address the policy and technical challenges in advancing V2X, including those highlighted by the Department through this RFC. Through collaborative engagement, we can quickly address the important questions still outstanding. In the sections that follow, we provide several recommendations to the Department to provide the necessary certainty to support future deployment of this life saving technology. These recommendations include:

- Provide greater policy certainty and assist industry in developing consensus on the most effective use of the 5.9GHz spectrum given the emergence of potential alternative V2X technologies.
- To the extent necessary, actively engage and convene industry discussion on the issues of technology interoperability, backwards compatibility, and coexistence in the 5.9GHz band so that we can collectively address these challenges more effectively.
- Conduct research to benchmark the performance attributes of different V2X technologies to determine how these may be effectively deployed within the context of the overall transportation system when considering the range of V2V, V2I, and I2V communication needs.
- Continue to engage with the Federal Communication Commission (FCC) to ensure a balanced, data-driven approach to spectrum policy that maintains the availability of all seven channels of the 5.9GHz for transportation safety free from harmful interference. It should be the collective goal of the Administration to advance V2X for transportation as the best use of the 5.9GHz band.
- Continue Phase II and Phase III testing to evaluate potential for harmful interference from unlicensed Wi-Fi communications, establishing clear deadlines and commitments from those proposing to advance potential sharing solutions.
- Provide resources, where possible, to support expanded testing and pilot deployment of V2X technology in support of connected automation application development.

Additional information related to each of these is provided in response to the questions highlighted by the Department in the RFC notice, below.

2. Discussion of V2X Technology

1. Please provide information on what existing or future technologies could be used for V2X communications, including, but not limited to, DSRC, LTE C-V2X and 5G New Radio. What are the advantages and disadvantages of each technology? What is the timeframe for deployment of technologies not yet in production? Please provide data supporting your position.

The following provides a brief overview of existing and known future technologies that could be used for V2X communications. More specifically, these include:

- Dedicated Short Range Communication (DSRC or IEEE 802.11p or OCB)
- IEEE NGV (IEEE 802.11bd; planned)
- LTE V2X (PC5 mode defined by 3GPP or Release 14/15)
- 5G New Radio V2X (PC5 mode defined by 3GPP Release 16; planned)

DSRC

Since the allocation of the 5.9 GHz spectrum to DSRC was made by the FCC, considerable research and development of DSRC-based V2X technology has been accomplished, from standards development to real-world testing and deployments involving DOT, State and local governments, and industry. As a result, DSRC technology is highly mature and proven on vehicles and infrastructure devices operating in real-world conditions on roadways throughout the U.S. In fact, as DOT notes in the request for comment, by the end of 2018, there were expected to be more than 18,000 vehicles deployed with aftermarket DSRC-based V2X communications devices and more than 1,000 infrastructure V2X devices installed at intersections and along roadways in 25 States. [2] This is in addition to deployment by General Motors, which began offering DSRC-based services in some production vehicles in Model Year 2017, and an announcement by Toyota in April 2018 that it would begin offering DSRC-based V2V technology on selected models beginning in 2021. Additionally, work continues to evolve DSRC communications technology and further improve its performance through the IEEE Next Generation V2X (NGV) initiative. This work, which is being done by the IEEE 802 LAN/MAN Standards Committee, is intended to produce a Next Generation V2X standard that will provide for improved communication performance (rate and sensitivity) and for support of new use cases such as localization.

IEEE NGV

The IEEE NGV V2X is currently in development to provide a pathway forward for the evolution of DSRC. IEEE completed the study phase for this new technology in December 2018, with an amendment scheduled for IEEE 802.11bd scheduled for 2021. This amendment would therefore provide a seamless evolution path for DSRC, and ensure communications protocols maintain interoperability, backwards compatibility, and coexistence.[3]

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[2] *83 FR 66338 (December 26, 2018)*

[3] *IEEE 802 LAN/MAN Standards Committee comments dated January 17, 2019, submitted to FCC GN Docket No. 18-357, Office of Engineering and Technology and Wireless Telecommunications Bureau Seek Comment on 5GAA Petition Waiver to Allow Deployment of Cellular Vehicle-To-Everything(C-V2X) Technology in the 5.9 GHZ Band.*

LTE-V2X

While the FCC's 5.9 GHz service rules originally contemplated deployment of DSRC as the sole V2X technology, LTE-V2X (a subset of C-V2X) has emerged as a potential competing option, with possible complementary usage pending further research in this area. The basic communication technology of LTE-V2X is based on cellular communication system LTE, and while there has been limited testing to date for V2X direct communication use, additional research may provide justification for further consideration of C-V2X. LTE-V2X is a standards-based technology with an evolutionary path to future development 5G New Radio V2X. LTE-V2X is based on 3GPP Release 14/15 standards, as will be next generation 5G-V2X. While C-V2X technology is argued to provide a V2X solution that will transition toward 5G, the actual path from LTE-V2X to 5G is not fully defined.

5G and 5G NR

The development of New Radio V2X (also referred to as NR V2X or 5G V2X) is still in the conceptual stages of development with the first generation standards development currently a study item within 3GPP – with publication expected in 2019.[4] This could potentially require designating separate channels for 5G V2X, which requires additional consideration as discussed in more detail below.

Consideration of DSRC and C-V2X (LTE and 5G NR) Technologies

Both DSRC and C-V2X are designed to support the entire range of communications necessary for V2X services: vehicle-to-vehicle ("V2V"), vehicle-to-infrastructure ("V2I"), vehicle-to-network ("V2N"), and vehicle-to-pedestrian ("V2P"). Both V2X technologies may be leveraged to support an expanded auto safety application ecosystem and to serve other public interest objectives, such as increasing mobility, decreasing congestion, improving fuel efficiency, and reducing emissions. Finally, both types of V2X technology intend to support further increasing vehicle autonomy, up to and including levels 4 and 5 autonomy as defined by SAE International ("SAE"). While robust testing has been conducted with respect to the development of DRSC, additional evaluation and benchmarking is needed to assess the relative performance characteristics of the various V2X technologies being considered.

We understand that, to date, there has been no comprehensive benchmarking analysis to evaluate the performance characteristics of available V2X communications technologies. DSRC is a mature and tested technology that is available commercially today, and while C-V2X continues to develop, we believe a data-driven approach will help identify whether alternative approaches provide enhanced or complimentary functionality.

DOT's Role in Evaluating the Deployment of V2X Technologies

Global Automakers understands DOT has pursued a technology-neutral approach to support innovation and provide flexibility to allow for the development of new technologies to achieve the safety and mobility benefits of connected vehicles; however, there is a need for common agreement in some areas to ensure the communication of critical safety information between all connected vehicles, infrastructure, and other road users. NHTSA recognized this in the V2V NPRM which identified DSRC as the primary communication medium, but also included provisions for other mediums if they could meet certain "performance and interoperability requirements, which are based on the capabilities of today's DSRC-based V2V communications."[5] In addition to the performance and interoperability requirements, it is necessary to consider the impact that the introduction

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[4] *We understand that as part of this development effort 3GPP decided in 2018 not to consider same channel-coexistence between 5G V2X and LTE V2X.*

[5] 82 FR 3881 (January 12, 2017)

of alternative technologies will have on the overall connected vehicles ecosystem as described by the existing 5.9 GHz band plan and SAE channel plan.[6]

As discussed further, below, there are a number of advantages to a single interoperable communications protocol that supports safety-of-life applications and provides an evolutionary path forward while ensuring backward compatibility. Allowing alternative communications technologies to operate in the band that are incompatible (*i.e.*, that require separate, dedicated channels due to the inability of the technologies to operate in the same channels without interference) would create significant issues for equipment that was deployed before the newer communications technology was introduced.

In addition, if there are no limits or overall strategy regarding the number of different technology protocols for V2X communications being deployed, there is a risk of further fragmentation of the 5.9 GHz band which could result in potential interference/inefficiency of all V2X communications. Such a situation could create a disincentive for developers, vehicle manufacturers, infrastructure operators, and consumers to invest in any V2X protocol, and could decrease the functionality of V2X overall as each communications protocol would be limited to operating within its own limited portion of the 5.9 GHz spectrum. Any action taken by DOT should seek to avoid such a situation and instead promote and accelerate the further development, deployment, integration and expansion of V2X in the transportation system.

3. Interoperability, Backward Compatibility, and Coexistence

> 2. *Of the V2X communications technologies previously discussed, at present only DSRC is permitted to be used in the 5.9 GHz spectrum band for transportation applications. If that allocation were to be changed to allow any communication technology for transportation applications, could DSRC and other technologies (e.g., C-V2X, 5G or any future technology) operate in the same spectrum band or even the same channel without interference? Why or why not? If there are any technical challenges to achieving this goal, what are they and how can they be overcome?*

The Department raises an important question with respect to the potential coexistence of multiple V2X technologies within the 5.9 GHz band and the extent to which these technologies can operate within the same channel. In identifying a path forward, however, there are a number of factors that need to be considered. As discussed above, the three primary V2X technologies referenced in the DOT notice – DSRC, LTE-V2X, and 5G – are fundamentally incompatible with each other, so interoperability between technologies is not possible. While it is theoretically possible that multiple technologies could coexist and operate on different channels within the band, research is needed to understand the potential for interference and what countermeasures need to be implemented to ensure this is avoided – both within a given channel, as well as any potential cross-channel interference.

If the 5.9GHz spectrum were allocated to allow multiple technologies to operate in the band, it is important that any policy decision in support of such an approach be based on a balanced, data-driven process that appropriately considers both the opportunities and opportunity costs for how the spectrum is utilized. This

[6] *47 C.F.R. § 2.106, n. NG160; Letter from Scott D. Delacourt, Counsel to Global Automakers, to Nicholas Degani, Senior Counsel, FCC Chairman Ajit Pai, Re: ET Docket No. 13-49, Attachment at 1-5 (filed June 28, 2017) ("2017 Ex Parte").*

should include, at a minimum, an assessment of the potential impact on incumbent DSRC deployments, a review of relevant standards applicable to V2X communications (and how these may be impacted), and an analysis of the how the channel "band plan" established through SAE may need to be reconsidered. In addition, it will also be necessary to evaluate whether any countermeasures to protect against interference as a result of coexistence further limit the utility of the spectrum.

In comments submitted to the FCC in response to a November 18, 2018, petition by the 5G Automotive Association (5GAA) requesting that the Commission waive its rules to permit C-V2X operations immediately on the top 20 megahertz of the DSRC band, Global Automakers urged the Commission to ensure a measured, data-driven approach to deployment, including testing and validation. These comments further discussed the need to address questions and issues related to the BSM, channel usage, real-world safety testing, and the impact of deployment.

We request that DOT adopt a similar data-driven approach and urge the Department to remain consistently engaged with the FCC to ensure any decision affecting the 5.9GHz band maintains the availability of all seven channels for V2X communications. We also encourage DOT leadership to facilitate discussions around these important issues, as we believe this will help provide for a more expeditious resolution with respect to the ongoing technology debate on V2X coexistence.

Addressing the question of coexistence does not, however, address the fundamental question of interoperability, which we believe is important in the context of low-latency V2X safety communications as discussed below.

3. *To what extent is it technically feasible for multiple V2X communications technologies and protocols to be interoperable with one another? Why or why not? Can this be done in a way that meets the performance requirements for safety of life applications, as they were discussed in the V2V NPRM? What additional equipment would be needed to achieve interoperability or changes in standards and specifications? What is the projected cost of any necessary changes? How soon can these changes and equipment prototypes be available for testing?*

It is important to clearly define what is meant by interoperability. We understand interoperability within the context of the RFC as the capacity for any V2X technology to communicate with one another. Based on this definition, and given fundamental differences between DSRC, LTE-V2X, and 5G, we believe it is not technically feasible for these technologies to be interoperable with one another. While each technology may be independently capable of meeting the performance requirements for safety-of-life applications, as discussed in the V2V NPRM, the lack of interoperability (or compatibility) between technologies means that the benefits of V2X may be limited solely to the interactions between vehicles and infrastructure equipped with each specific technology. For example, it is not possible for a vehicle equipped with DSRC to communicate the BSM with a vehicle solely equipped with C-V2X. The critical network effect will in effect be divided depending upon the level of deployment of each technology. In addition, without addressing outstanding questions related to spectrum allocation, issues of potential harmful interference may persist – a significant concern when considering safety of life applications. For an interoperability solution to be realistically valid, it needs to be available at all times and the low latency requirement for safety related application must be met.

It may be possible to ensure some degree of "device interoperability" through a hybrid approach where a specific V2X device may be equipped with multiple radio antennae capable of communicating using DSRC and LTE-V2X (and/or 5G) technology. This approach, while technically feasible, would not address the spectrum policy issues needed to ensure communications free of harmful interference. Additional costs and complexities are also introduced due to the need for multiple radios to be installed in the vehicle.

As discussed previously, there are challenges to the coexistence of multiple technologies operating in the same channel. Additional research and discussion are needed to better understand the opportunities and tradeoffs with a multi-technology approach and how these can be addressed to ensure the most effective use of the spectrum. More specifically, if the spectrum were to be allocated such that different technologies operate in different parts of the band, careful consideration should be given to understand what applications may no longer be made possible due to imposed limitations on available spectrum for each respective technology, and how any redundancy can be reduced to more effectively utilize bandwidth. The potential tradeoffs increase further as more technologies are considered, and we would urge DOT to help drive industry towards a consensus approach for how effective, interoperable, backward-compatible coexistence can be achieved.

While we appreciate DOT's interest in a technology-neutral approach to V2X, we do not believe this is a practical long-term solution to the question of interoperability. It may be necessary for DOT to establish some level of standardization to ensure greater policy certainty and support interoperability for V2X communications. This could include the development of an "if-equipped" regulation for V2X technologies deployed in the 5.9 GHz band that would define the necessary minimum safety performance standards for V2X communications.

4. *To what extent is it technically feasible for different generations of the same V2X communications technologies and protocols to be interoperable with one another? Why or why not? Can this be done in a way that meets the performance requirements for safety of life applications? What additional equipment or changes in standards and specifications would be needed to achieve interoperability? What is the projected cost of any necessary changes?*

Global Automakers believes it is important that different generations consider interoperability (or backwards compatibility) to ensure that new vehicles can communicate with legacy fleet vehicles equipped with earlier generations of the same V2X communications technology. This is an important factor when considering safety-of-life applications, as any limitations on providing such backwards compatibility could impact the overall network effect in deploying V2X. It is our understanding that both DSRC and C-V2X standards development efforts have considered an evolutionary pathway forward to enable backwards compatibility over the anticipated life cycle of vehicles. Additional comparative analysis may be necessary to more fully understand how technology interoperability and backwards compatibility will be maintained or addressed over the expected lifecycle of a vehicle.

4. Impact of Multiple Technologies

5. *Even if they are interoperable across different technologies and generations of the same technology, would there be advantages if a single communications protocol were to be used for V2V safety communications? What about other V2X safety applications, such as those involving V2I and V2P communications?*

The use of a single protocol could help ensure the most effective use of spectrum. A single protocol reduces the potential technical complexity in designing V2X systems, while also reducing the number of vehicle components needed to support vehicle communication. A single protocol also supports interoperability and accelerates the deployment of V2X applications. Increased interoperability can also help provide the greatest safety benefit.

In addition, there may be a need to assess potential latency issues that may arise as a result of multiple technologies deployed in the band, as each respective technology would be limited in the amount of available spectrum (depending on how coexistence is defined or established). With fewer channels, increased congestion may require countermeasures to avoid any degradation in communications performance to ensure reliable BSM communications in high-volume traffic environments.

On the other hand, multiple V2X technologies may provide complimentary functionality, but additional research is needed to better assess the potential impact. In cases where multiple technologies may be deployed, the net overall functionality/benefit of a V2X device will likely be a biproduct of the level of deployment of either technology, as well as the applications made possible through the technology being tested/deployed. While there may be benefits that come from a multi-technology approach, due to certain applications being more suited to a given protocol, there are also potential challenges. As such, it is important that DOT consider both the tradeoffs and opportunity cost. We recommend that the department engage in collaborative research with industry to independently benchmark various V2X technologies and identify the extent to which various V2X technologies can provide additional safety redundancy or complimentary functional capabilities. Such research would be significant in informing spectrum policy decisions and could also support future standards development efforts that may be needed should the data justify consideration of multiple technologies.

6. *How would the development of alternative communication technologies affect other V2I and V2P communications, such as those supporting mobility or environmental applications? Do these applications have the same or different interoperability issues as V2V safety communications? Do different V2X applications (e.g., platooning) have different communication needs, particularly latency?*

Certain V2X applications may have different communication needs and may use different service channels. For example, DSRC currently supports platooning applications, with the operation requiring the use of a specific service 10 MHz channel.

Interoperability is arguably the most important factor in maximizing the effectiveness and utility of the spectrum and ensuring a robust network effect whereby even non-V2X equipped vehicles can indirectly benefit from communication technology. Different V2X applications will have different communication needs, depending upon power, latency, and range requirements, with the SAE “band plan” providing a schematic for the different types of V2V, V2I, V2P, or I2V applications that may be relevant to each channel within the 5.9GHz band. The introduction of multiple communication technologies may require those previously planning to deploy certain applications to revisit or reconsider their commitment until additional certainty can be provided.

The current policy environment presents significant uncertainty in the marketplace with respect to investment and deployment of V2X due to the potential risks associated with rechannelization or “opening up” of the Safety Spectrum. This uncertainly also impacts other key stakeholders, including infrastructure owner operators and fleet managers that are seeking to invest and implement V2X technology in the near term.

7. *Do different communication technologies present different issues concerning physical security (i.e., how to integrate alternative communication technologies into vehicle systems), message security (i.e., SCMS design or other approaches), or other issues such as cybersecurity or privacy? Would these concerns be affected if multiple but still interoperable communication technologies are used rather than one?*

The challenges related to vehicle cybersecurity and privacy are the same regardless of the V2X technology being considered, and solutions have already been developed to address these. The SCMS plays an important role in ensuring the security, privacy, and integrity of V2X communications. The standards developed for DSRC have demonstrated abilities for a proven, simple, future-proof, and secure BSM. These standards can be leveraged for other V2X technologies, and we understand that C-V2X incorporates a number of the key elements previously established.

The integration of multiple technologies may require multiple SCMS administrators or separate systems to manage secure communications for each protocol, adding further complexity for how an interoperable solution might be managed.

As industry looks to build out the SCMS to support further V2X deployment, we believe DOT will likely be an important stakeholder. We encourage ongoing engagement by the Department as industry seeks to further define the organizational structure of the SCMS to better ensure integrity, authenticity, and privacy of BSM communications.

5. Connected Automation

8. *How could communications technologies (DSRC, LTE-V2X, 5G or some other technology) be leveraged to support current and emerging automated vehicle applications? Will different communication technologies be used in different ways? How?*

Global Automakers believes that connected vehicle technology is essential to realizing the full potential of automated vehicle technology, supporting both current and emerging automated vehicle applications. While automated vehicles can be deployed without V2X, the integration of low-latency communications can enhance the sensing and awareness of the surrounding roadway and infrastructure environment, further expanding the operational design domain capabilities and cooperative automation potential of AVs.

The way in which different communications can be leveraged to support automated vehicle applications is currently being researched and developed as part of broader efforts related to the testing and deployment of automated vehicles. The way in which such applications can be effectively integrated, if at all, is again subject to uncertainty with respect to spectrum policy. As discussed previously, there is a need to consider the impact and potential opportunity costs associated with the deployment of multiple technologies (V2X and unlicensed) in the 5.9GHz band. Both industry and DOT need to consider how best the spectrum can be utilized to minimize unnecessary redundancy and optimize the applications made possible through V2X given limited channels within the band. In the near-term, the deployment of multiple technologies could result in potential inefficiencies.

At present, manufacturers seeking to support deployment are forced to proceed with uncertainty. This could limit near-term consideration for certain AV applications depending on implementation. Such uncertainty negatively affects both the automotive industry and Department of Transportation who stand to miss out on the collective benefits of enhanced connected automation.

6. Section VI - Deployment

9. *How could deployments, both existing and planned, assess communications needs and determine which technologies are most appropriate and whether and how interoperability could be achieved?*

While significant research and development efforts have been undertaken to establish the communication needs for DSRC technology, the emergence of other potential V2X technologies has created uncertainty with respect to how established communications needs may have to be curtailed. In the absence of clearly defined communication needs for C-V2X technology, the question is still outstanding on whether the available spectrum can accommodate the needs of both (or multiple) technologies. Industry recognizes the important need for research to better determine the collective need of technology providers and the extent to which potential redundancy needs to be addressed.

It is essential that a balanced, data-driven process be applied to assess the communications needs and determine which technologies are most appropriate and to assess issues of interoperability (or the impact of any solutions considered in the absence of interoperability). Irrespective of the V2X technology being considered, a network effect is essential to ensure benefits are more widely realized.

As suggested in our recent comments on the previously mentioned 5GAA waiver request, additional testing of LTE-V2X/5G can be achieved through expanded experimental licensing. Indeed, to that end, Ford was recently granted permission to test C-V2X functionality in California in the 5.9GHz band.[7] Such research is needed to better understand how C-V2X may supplement or complement DSRC and/or other communications protocols and the extent to which spectrum use can be optimized.

DOT can play an important role in helping convene key stakeholders to discuss this important issue and further define the communications needs, which are to an extent driven by the potential applications provided through V2X. Ensuring greater policy certainty will help support further investment and deployment.

10. *Are there any additional issues that need to be considered beyond the comments identified in this notice? For example, how does the potential for multiple technologies impact the spectrum channel usage?*

As discussed above, the ongoing technology debate may require existing technical standards to be revisited should there be a change in spectrum policy. This means there will also be a need to understand the impacts on existing and planned deployments.

[7] *Experimental License, Ford Motor Company, File No. 1020-EX-CN-2018, Call Sign WJ2XYG (granted Feb. 15, 2019).*

We also urge the Department to continue its efforts related to Phase II and Phase III testing to evaluate potential for harmful interference from unlicensed Wi-Fi communications, establishing clear deadlines and commitments from those proposing to advance potential sharing solutions to address this issue.

7. Conclusion

The automotive industry continues to be committed to pursuing V2X technology to enhance safety and support the deployment of connected and automated vehicle applications that will enable greater mobility, efficiency, and environmental benefits. This is a shared goal with the mission of DOT and success in deployment will be critical in establishing the U.S. as a global leader in transportation, allowing for the effective movement of goods, services, and people. In adopting a purely technology-neutral approach, the Federal government has presented the industry with a significant challenge in addressing the issue of interoperability within the context of a competitive marketplace environment. While we recognize the challenges for the Department in selecting technology *winners and losers*, we believe a data driven process will help establish a clear pathway forward.

DOT leadership will be critical in informing FCC policy and maintaining the availability of all seven channels of the 5.9GHz spectrum to support one or more technology solutions in the band, so we urge continued engagement with industry as it navigates this important issue. Any adverse decision by the Commission could have significant implications for DOT and the future of intelligent transportation systems. By ensuring a balanced, data-driven process, we can move expeditiously toward providing the necessary policy certainty to support long-term planning decisions for all stakeholders with a vested interest in transportation -- including Federal, State, and local governments that also stand to benefit from the deployment of V2V and V2I technology.

We thank the Department again for its continued efforts to advance V2X in the United States and emphasize Global Automakers' commitment to working with DOT.