February 20, 2019

Mr. Finch Fulton
Deputy Assistant Secretary for Transportation Policy
U.S. Department of Transportation
1200 New Jersey Avenue SE
Washington, DC 20590-0001

Re: Request for Comment on Docket DOT-OST-2018-0210: V2X Communications

Dear Deputy Assistant Secretary Fulton:

The Institute of Transportation Engineers (ITE) is pleased to provide comments on the US Department of Transportation's "V2X Communications" Request for Comment (Docket Number DOT-OST-2018-0210), published in the Federal Register on December 26, 2018.

ITE is an international membership association of transportation professionals who work to improve mobility and safety for all transportation system users and help build smart and livable communities. Founded in 1930, ITE is a community of more than 15,000 transportation professionals, including transportation engineers, transportation planners, consultants, educators, technologists, and researchers, who network through meetings, seminars, and publications.

ITE believes strongly that the development of solutions and technology such as connected and automated vehicles (CAVs) are an important element in achieving "Vision Zero" - an international movement to end fatalities on our roadways. More than 40,000 people die each year on America's highways and 1.25 million people die worldwide. This is unacceptable. Vision Zero must be our goal.

A key component toward meeting that goal is enabling Vehicle-to-Everything (V2X) communications. Cooperative systems achieved through communication between vehicles, infrastructure, and other users will provide an enhanced layer of safety and must be advanced. This ability to communicate will be essential for extending the range of vehicle-based sensing and achieving the full potential of safety benefits envisioned by CAVs.

A strong government role will be critical to ensure that the deployment of CAV improves the quality of life for all citizens, and we applaud US DOT's efforts to further explore V2X development and technology compatibility issues. Governments can play a key role in working with the private sector to facilitate deployment and remove regulatory barriers to the widespread deployment of proven technologies.

ITE has an active CAV Steering Committee that brings the voice of many transportation engineering disciplines to the table. We offer comments on some of your specific questions set forth in the Request for Comment, and look forward to continuing to work with the USDOT and its modal administrations in the testing and implementation of connected and automated vehicles.

Sincerely,

Bruce Belmore
ITE International President

USDOT QUESTIONS AND ITE ANSWERS

Dialogue is a critical component of our CAV future. The US DOT can play a vital role in helping foster structured collaboration among manufacturers, technology developers, infrastructure owners and operators, law enforcement and relevant government agencies to establish protocols that will help advance safe operations during both testing and deployment of V2X technologies as well as CAV solutions in general.

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.

As noted in US DOT's "Preparing for the Future of Transportation, Automated Vehicles 3.0," throughout the nation there are over 70 active deployments of vehicle-to-infrastructure (V2I) communications utilizing the 5.9 GHz band, and an even larger number when you consider all the possible V2X evaluations underway. US DOT currently estimated that by the end of 2018, over 18,000 vehicles would have been deployed with aftermarket V2X communications devices and over 1,000 infrastructure V2I devices installed at the roadside.

A majority of these implementations are using Dedicated Short-Range Communications (DSRC) for "trusted" communications. DSRC is not only proven technology, but it is being deployed nationwide.

An effort led by State and local public-sector transportation infrastructure owner operators is the national Signal Phase and Timing (SPaT) Challenge. This initiative has plans to deploy a DSRC-based V2X communications infrastructure with SPaT broadcasts in at least one corridor with at least 20 signalized intersections, in each of the 50 States by January 2020. There are over 200 infrastructure communications devices already deployed with over 2,100 planned by 2020 under this initiative in 26

States and 45 cities with a total investment of over $38 million. The SPaT message is designed to enhance both safety and efficiency of traffic movements at intersections. Typically, intersection geometry (MAP) messages complement the SPaT projects, and provide location-specific detail to enhance the output from the CV and AV technologies.

ITE also believes that cellular-based V2X technology (C-V2X) will very likely have a promising future, and additional pilot deployments and testing should continue. But the delays in deploying DSRC caused by government inaction (or worse, government interference), are discouraging/preventing potential life-saving technology of DSRC from being deployed.

ITE believes that action now is important. DSRC is ready now, and should be deployed now, while C-V2X progresses through development and testing phases. A recent study by the University of Michigan Transportation Research Institute noted that "by deploying DSRC-based V2V communication systems in 2019, millions of light-vehicle crashes could be prevented as compared to waiting even three additional years to deploy C-V2X. More importantly are the millions of injuries and tens of thousands of lives that could be saved by deploying DSRC in 2019 - instead of waiting three, or more, years for C-V2X to reach a level of readiness comparable to DSRC."[1]

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?

We believe that a future including both DSRC and C-V2X would provide the most opportunities for safety benefits to be realized, and support efforts toward compatibility in all V2X communications. However, we also recognize that current technological limitations are such that DSRC and C-V2X cannot operate in the same channel. DSRC and C-V2X devices could exist on separate channels - coexistence, but not true interoperability. We urge government and industry to seek a solution where coexistence of technology can occur, without having to discard years of investment, research, and the opportunity to save lives now instead of waiting for future possibilities.

Note: future versions of DSRC, also known as Next Generation V2X (IEEE 802.11 NGV), will be designed to be interoperable/backwards compatible.

[1] http://www.umtri.umich.edu/what-were-doing/news/cost-fatalities-injuries-and-crashes-associated-waiting-deploy-vehicle-vehicle

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?

While ITE supports continued testing and evaluation of C-V2X technology, given the significant number of existing and planned DSRC-based infrastructure deployments, there are tax-payer funded implications to changing utilization parameters for the currently reserved 5.9 GHz band. Many of these deployments are currently using all 7 channels, and a decision to give a portion to a non-compatible technology in the band would result in government agencies (federal, state, and local) having to spend more public-sector money to deploy new technology.

We urge government and industry to seek a solution where coexistence of technology can occur, without having to discard years of investment, research, and the opportunity to save lives now instead of waiting for future possibilities.

Further, we urge the FCC to maintain the integrity of the 5.9 GHz band for safety and V2X purposes, maximizing the potential benefits to public safety in the near term. If in the future technology develops that allows interoperability or proven shared use of the space, we would urge government and industry to collaboratively work toward maximum use of the spectrum, providing safety remains the top priority.

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?

Specific to SAFETY applications, there is merit in having every vehicle being able to communicate with every other vehicle, and communicate with every roadside, pedestrian, or mobile device - this would realize the full potential of V2X communications and result in more lives saved and increased mobility. A unified protocol would yield the most benefits for safety. The question is whether or not such an interoperable approach is required for non-critical applications, and whether market evolution should drive the non-safety focused applications?

There are many applications in a V2X scenario where communications technology that is not ultra-low latency and high bandwidth will continue to be ideal mediums for use. In fact, some automakers have publicly stated their desire to utilize multiple forms of vehicle-to-cloud communications; as they do today (cellular and satellite are often found in tandem across multiple vehicle lines).

In an interview with the Eno Foundation last year, officials from Toyota specifically noted that "adopting DSRC for collision avoidance and other related safety purposes does not prevent or limit usage of other communication technologies, including cellular technology for long-range vehicle connectivity. However, when it comes to short-range, direct V2V and V2I communication specifically for collision avoidance or other related safety purposes, DSRC is the only communication technology that is ready for prime time."[2] That interview came on the heels of Toyota announcing that it will deploy DSRC on Toyota and Lexus vehicles sold in the US starting in 2021, with the goal of adoption across most of its line-up by the mid 2020's.

8. How could communications technologies (DSRC, C-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?

There will continually be an expanding need for communications technology and emerging technologies to meet those needs. As noted previously, some automakers have publicly stated their desire to utilize multiple forms of vehicle-to-cloud communications. To realize the full potential of V2X technologies, we must be willing to adopt a technology when it has been proven to meet the requirements of the applications which we want to deploy and then we must also be able to adapt to new technologies as they emerge. If we continually wait for the next technology that is in development to finally arrive, we will be waiting forever and there will continue to be tremendous loss of life that may have been preventable.

A key element of this exploration, however, is maintaining a priority on safety applications. A communications medium for safety applications should not be selected based on its merit for other non-critical applications. Communication technologies that enable safety applications should remain the top priority, and they should be free from interference that could be caused by non-safety applications. If a secondary communication medium can better serve the non-safety applications then once again, we should explore co-existence instead of trying to force interoperability.

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?

Many industry experts are adamant that we are not looking at a debate between two different technologies that serve the same purpose. ITE supports that notion, and instead we believe it should be a discussion of how quickly can we deploy what is currently proven today (DSRC) while still exploring

[2] https://www.enotrans.org/article/dsrc-is-best-suited-for-collision-avoidance-and-other-safety-applications/

future technological advancements (C-V2X) in such a manner that they can be complementary and not competitive.

Specific to the existing FCC report and order that defines use of the 5.9 GHz spectrum, ITE believes that any changes in the short term would have the effect of hitting the “reset” button and erasing all the valuable lessons learned - and significantly setting-back nationwide deployment of life-saving technology.

From an infrastructure owner/operator perspective, currently available C-V2X technology requires much of the same roadside hardware as DSRC, yet is less proven and less available because it’s still being developed. We support deployment of DSRC now, remain open to additional testing of C-V2X as the development progresses, and encourage a future where DSRC and C-V2X can one day enjoy compatibility/coexistence.