National Transportation Safety Board
Washington, DC 20594

Office of the Chairman

March 11, 2019

Docket Management Facility (M-30)
US Department of Transportation
1200 New Jersey Avenue SE
Room W12-140
Washington, DC 20590-0001

Attention: Docket No. DOT-OST-2018-0210

Dear Sir or Madam:

The National Transportation Safety Board (NTSB) has reviewed the US Department of Transportation (DOT) Notice of Request for Comments (RFC), "V2X Communications," published at 83 *Federal Register* 246, December 26, 2018. For more than two decades, DOT has engaged in research; completed funded deployment programs; and developed proposed standards for vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), and vehicle-to-pedestrian (V2P) communications—collectively referred to as vehicle-to-everything (V2X). DOT has focused on dedicated short-range communications (DSRC) as the primary communications medium for deployment of V2X technologies.

In January 2017, the National Highway Traffic Safety Administration (NHTSA) issued a Notice of Proposed Rulemaking (NPRM) to mandate V2V communications for new light-duty vehicles and identified DSRC as the primary communications platform.[1] In response to the NPRM, stakeholders within academia, the telecommunications community, and the automobile industry voiced concerns regarding the reliance of V2X communications on DSRC given the significant advances in the realm of cellular (C-V2X) and 5G communications.

Recognizing that C-V2X may offer advantages over DSRC, DOT is appropriately querying stakeholders on whether DSRC as the primary means of V2X communications is consistent with recent technological developments. Additionally, the agency is interested in learning more about the interoperability of alternative cellular technologies with each other and with DSRC, whether alternative technologies present additional concerns regarding physical security, and how C-V2X communications can be leveraged to best support current and emerging automated vehicle applications.

The NTSB is pleased to provide comments on V2X communications and reiterate our long-standing position that connected vehicle technologies have the potential both to reduce crashes, fatalities, and injuries on our nation's highways and to enhance the capabilities of

[1] See "Federal Motor Vehicle Safety Standards: V2V Communication," 82 *Federal Register* (FR) 3854, January 12, 2018.

currently available vehicle-based collision avoidance and automated technologies. We do not intend to answer the technical questions in the RFC regarding the differences in and compatibility of DSRC versus C-V2X technologies. The NTSB is safety-focused, with an interest in expanding and ensuring the widespread and timely deployment of lifesaving technologies, such as V2X, to all road users. Although we are cognizant of the research, effort, and financial investment by DOT, state and local governments, and industry toward the development and deployment of V2X technologies based on DSRC, it is vital that alternative cellular communication mediums be considered to ensure the most widespread, timely, and efficient deployment and the most likely adoption by industry and consumers.

The NTSB is not proposing that DOT "go back to the drawing board" and start anew with emerging alternative cellular technologies. Instead, we are hopeful that DOT will carefully review the input of stakeholders and—through collaboration with the public and private sectors—identify a means by which DSRC and C-V2X can coexist to advance safety. A comprehensive analysis is needed to determine the advantages and disadvantages of available technologies to better inform decision making. Simultaneously, DOT should not put existing lifesaving technologies, such as DSRC, on hold while waiting for the next emerging technology to arrive, be tested, and be thoroughly vetted—which would result in an endless cycle of research and development and drastically delay the implementation of existing technologies that can save lives today.

Background

Since the mid-1990s, the NTSB has advocated intelligent vehicle technologies that rely on in-vehicle sensors, V2V communications, and V2I communications. The NTSB first addressed collision avoidance during its investigation of a 1995 multivehicle collision in Menifee, Arkansas, in which a commercial vehicle entered dense fog, slowed from 65 mph to 35 to 40 mph, and was then struck from behind.[2] Subsequent collisions occurred as vehicles drove into the wreckage. This crash, which involved eight loaded truck-tractor semitrailer combination units, resulted in five fatalities.

Even at that time, in advance of today's wirelessly connected world, the need to establish dedicated communication airwaves for technologies that could prevent such collisions was recognized. As a result of the Menifee crash, the NTSB issued Safety Recommendation H-95-46 to the Federal Communications Commission (FCC), which stated:

> Expedite rulemaking action on the allocation of frequencies that would enhance the development possibilities of collision warning systems.

In 1996, following this recommendation, the FCC considered putting intelligent transportation system (ITS) applications into the 5.9-GHz band. In 1999, the FCC set aside 75 MHz of radio spectrum in the 5.9-GHz band for collision avoidance systems. Safety Recommendation H-95-46 was classified "Closed—Acceptable Action." At the time, technologies

[2] See *Multiple Vehicle Collision With Fire During Fog, Near Milepost 118 on Interstate 40, Menifee, Arkansas, January 9, 1995, and Special Investigation of Collision Warning Technology*, NTSB/HAR-95/03 (Washington, DC: NTSB, 1995).

such as C-V2X and 5G did not exist, and DSRC was chosen because it was the only short-range standard available.

Since the closure of Safety Recommendation H-95-46, the NTSB has issued several additional safety recommendations concerning technologies that rely on the wireless communication band established by the FCC.[3] Although development has been slow, connected vehicle systems using DSRC have advanced. DOT has sponsored voluntary standards, conducted cost-benefit analyses, and sponsored fleet operational testing. In 2011, NHTSA analyses showed that DSRC-based connected vehicle technology could address approximately 80 percent of crash scenarios involving nonimpaired drivers.[4]

In February 2013, the FCC released an NPRM to amend the rules governing the operation of Unlicensed National Information Infrastructure (U-NII) devices in the 5-GHz band.[5] The FCC sought public comment on whether the 5.9 GHz allocated for DSRC might be shared with unlicensed devices—principally Wi-Fi devices. In response to the NPRM, the NTSB stated that it is not opposed to spectrum sharing in principle, but the security of preestablished communication frequencies related to transportation safety must first be ensured. Spectrum sharing could put the communication frequencies at risk of dangerous interference, and much is still unknown about frequency interference when it comes to the vast numbers of connected vehicles in motion. Upon review of public comments, the FCC released a report identifying a number of risk elements associated with the likelihood of harmful interference from large numbers of U-NII devices and concluded that further analysis was required.[6] The feasibility of spectrum sharing is being investigated as part of a three-phase test plan, the results of which are pending.[7]

In 2013, the NTSB further evaluated the advantages of connected vehicle technology in the investigation of a fatal intersection crash near Chesterfield, New Jersey, in which a school bus drove into the path of a dump truck, resulting in the death of one child and the injury of several others.[8] The NTSB determined that had V2V technology been available on the vehicles, the school bus driver would have received warnings of the approaching truck and the crash may have been avoided. As a result of the investigation, the NTSB issued Safety Recommendations H-13-30 and -31 to NHTSA to develop minimum performance standards for connected vehicle technology for all highway vehicles and to require that the technology be installed on all newly manufactured vehicles. On August 10, 2018, in our most recent response to NHTSA, we discussed that—though these recommendations were issued 5 years ago—little progress has been made toward their

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[3] (a) See *Vehicle- and Infrastructure-based Technology for the Prevention of Rear-End Collisions,* NTSB/SIR-01/01 (Washington, DC: NTSB, 2001). (b) *Truck-Tractor Semitrailer Rear-End Collision into Passenger Vehicles on Interstate 44, Near Miami, Oklahoma, June 26, 2009,* NTSB/HAR-10/02 (Washington, DC: NTSB, 2010).

[4] *NHTSA Fact Sheet: Improving Safety and Mobility Through Connected Vehicle Technology* (Washington, DC: DOT, 2011)

[5] *Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band,* 81 FR 36501, June 7, 2016.

[6] *Evaluation of the 5350-5470 MHz and 5850 MHz Bands Pursuant to Section 6406(b) of the Middle Class Tax Relief and Job Creation Act of 2012* (Washington, DC: US Department of Commerce, 2013).

[7] FCC Public Notice, *The Commission Seeks to Update and Refresh the Record in the U-NII Devices in the 5 GHZ Band Proceeding* (Washington, DC: FCC, June 2016).

[8] See *School Bus and Truck Collision at Intersection Near Chesterfield, New Jersey, February 16, 2012,* NTSB/HAR-13/01 (Washington, DC: NTSB, 2013).

implementation, and no further action has been taken since the 2017 NPRM. Pending significant action toward accomplishing these recommendations, they were classified "Open—Unacceptable Response." In addition to the slow pace of activity, we were also concerned that the 2017 NPRM focused on light vehicles only. Safety Recommendations H-13-30 and -31 apply to all vehicles—light and heavy.

In 2016, the NTSB evaluated how V2V technologies could be leveraged to support emerging automated vehicle applications in the investigation of a fatal crash in Williston, Florida.[9] Our investigation found that the safety benefits of vehicle automation systems can be enhanced by fusing V2V communications-based technology with vehicle-based systems. The NTSB found that V2V technology could address possible crash situations (such as intersection and left-turn scenarios) that are challenging for current vehicle-based safety systems. Additionally, we determined that V2V communications provide a complementary source of information to vehicle-based systems, improve the reliability and accuracy of data, extend the range of threat detection, and detect crash risks that are outside a vehicle-based sensor's field of observation.

In 2017, NHTSA issued an NPRM to mandate V2V communications for new light-duty vehicles and to standardize the communications requirements (using DSRC) of V2V messages. In response to this NPRM, the NTSB did not evaluate the advantages or disadvantages of DSRC compared to other emerging cellular technologies, but we did affirm the need for a government mandate for this technology. Widespread deployment of V2V is needed within the highway vehicle fleet to fully achieve the safety benefits of V2V and infrastructure technologies. Based on NTSB experience with the slow voluntary deployment of vehicle-based advanced driver assistance systems, a government mandate is essential for market saturation of V2V technology.[10] Safety improvements from enabling vehicles to communicate with each other will be greater if all vehicle types are equipped with the technology. The NTSB urged NHTSA to expand its proposed rulemaking to address all highway vehicles—including commercial vehicles, such as trucks and buses, and motorcycles.

With regard to our past efforts and recommendations related to V2X technologies, the NTSB asserts the following: (1) V2X technologies can reduce crashes, fatalities, and injuries on our nation's highways. (2) Although the NTSB is technology-neutral on the form of communication medium used to connect vehicles, infrastructure, and pedestrians, it is essential that DOT and FCC complete their three-phase spectrum sharing test plan to fully understand the associated risks prior to opening up the dedicated frequency band to other cellular or wireless applications. (3) V2X technologies will enhance emerging automated vehicle systems by providing a complementary source of information. (4) Widespread deployment of V2X technologies requires a government mandate to ensure market saturation and safety.

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[9] See *Collision Between a Car Operating With Automated Vehicle Control Systems and a Tractor-Semitrailer Truck Near Williston, Florida, May 7, 2016*, NTSB/HAR-17/02 (Washington, DC: NTSB, 2017).

[10] See *The Use of Forward Collision Avoidance Systems to Prevent and Mitigate Rear-End Crashes*, NTSB/SIR-15/01 (Washington, DC: NTSB, 2015). The report documents the slow rate of voluntary deployment of forward collision warning systems despite their lifesaving benefits.

Summary

The NTSB appreciates the opportunity to comment on this RFC addressing the importance of advancing V2X communications. Acknowledging that critical safety benefits are unrealized because of the time it has taken to implement V2X technology, we encourage DOT to facilitate the widespread deployment of this lifesaving technology.

Sincerely,

Robert L. Sumwalt, III
Chairman