

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Use of the 5.850-5.925 GHz Band)	ET Docket No. 19-138
)	
)	

COMMENTS OF THE ALLIANCE FOR AUTOMOTIVE INNOVATION

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I. INTRODUCTION AND SUMMARY

The Alliance for Automotive Innovation (“Auto Innovators”), which represents 36 members including automakers, suppliers, and tech companies, are united in their goal of an ever safer, cleaner, and smarter transportation system. Connected and automated vehicle technologies are essential to this shared vision becoming a reality. Vehicle-to-everything (“V2X”) communication technologies stand to deliver enormous safety and lifestyle benefits to the American public, including drastically reducing automotive crashes and fatalities and producing economic, environmental, and transportation efficiencies. For these benefits to be realized, the Commission should abandon its proposal in the *NPRM* and instead preserve the entire 75 MHz of the 5.9 GHz band for V2X, whether using dedicated short range communications (“DSRC”) or cellular vehicle-to-everything (“C-V2X”) technologies. These comments do not take a position with respect to which technology or technologies should operate in the 5.9 GHz band for transportation safety, recognizing that the V2X future may include DSRC, C-V2X, or both. Instead, these comments focus on the need to preserve all 75 MHz for transportation safety, and

the significant risk of harmful interference should a portion of the band be reallocated for unlicensed usage.

Reducing the amount of spectrum available for V2X to 30 MHz would severely limit the safety applications that can be utilized in the spectrum, compromise the technology's life-saving potential, and sacrifice American leadership and innovation in this substantial segment of the economy. Stakeholders across the transportation ecosystem are already working to deploy V2X technology in the 5.9 GHz band, and innovation for the next groundbreaking steps in advanced vehicle communications and automated transportation are ongoing. The Commission should not stymie this progress by decimating the spectrum available for V2X in the 5.9 GHz band.

The Commission's band plan proposal in the *NPRM* neglects to consider several important factors. First, testing shows that the Commission's proposal to reallocate the lower 45 MHz of the 5.9 GHz band for unlicensed uses would create pervasive harmful interference to V2X communications, which must operate in a reliable and secure environment to support constant communications between vehicles and infrastructure. The potential for harmful interference from unlicensed operations to V2X is so great that the Commission's proposed band plan essentially eliminates the ability of V2X to utilize the band. Second, while ample other spectrum is available for unlicensed use, it is not feasible to reallocate V2X to spectrum outside of the 5.9 GHz band. Third, the FCC lacks authority to adopt and implement the proposed band plan. Fundamentally changing the incumbents' 5.9 GHz licenses as the *NPRM* proposes would violate Sections 316 and 312 of the Communications Act. For these reasons, the full 75 MHz of the 5.9 GHz band must be retained for V2X.

In addition, the *NPRM* fails to properly account for the costs and benefits of the Commission's proposal. The *NPRM* departs, without explanation, from the standard practice of

the FCC, and a host of other federal agencies, of using the Value of a Statistical Life (“VSL”) to measure the benefits of a safety-of-life service. The Commission also ignores or systematically undervalues V2X benefits in terms of avoiding substantial human suffering, healthcare, and property damage costs, as well as ignoring the economic value that will disappear if automated vehicle innovation is delayed or set back. At the same time, the *NPRM* overvalues the benefits of reallocating spectrum for unlicensed usage by considering the benefits of unlicensed generally as opposed to the benefits of an additional, incremental 45 MHz where the Commission has already allocated vast amounts of spectrum for unlicensed and is poised to allocate still more at 6 GHz. Further, the Commission’s calculations show only the benefits of its proposed action for unlicensed without considering the loss resulting from the foreclosure of V2X. The Commission should properly weigh the costs and benefits of reducing the spectrum available for life-saving V2X technologies before establishing a new band plan in the 5.9 GHz band.

Finally, the Commission should continue its ongoing testing to determine how the 5.9 GHz band could be shared with unlicensed devices without resulting in harmful interference to V2X, while avoiding delay in DSRC or C-V2X accessing the spectrum. To launch testing to inform a decision and then issue a decision before the testing is complete is the epitome of arbitrary and capricious decision making. The Commission should prioritize use of a data driven, fact-based approach to optimizing current and future utilization of the 5.9 GHz band. By revising its proposal to support the use of V2X and delivery of life-saving benefits for the American people, the Commission will best fulfill its statutory mandate to promote efficient and beneficial use of the radio spectrum for all Americans.

II. THE RECORD SUPPORTS PRESERVING ALL 75 MHZ OF THE 5.9 GHZ BAND FOR V2X SERVICES.

When the original 75 MHz of spectrum in the 5.9 GHz band was allocated for intelligent transportation systems (“ITS”) technologies, no one could have envisioned the stunning technological developments to come—from greater connectivity amongst our mobility ecosystem, to the future of automated vehicles, as well as the coming of fifth generation (“5G”) wireless technology—and even more innovation is on the horizon. Few policymakers and individuals realized the role that connectivity would come to play in ensuring vehicles’ safe and efficient co-existence with other vehicles, infrastructure, and pedestrians. Today, however, it is even more evident that V2X communication technologies can offer life-saving services as well as other essential societal benefits. The entire automotive ecosystem, including both DSRC and C-V2X stakeholders, the United States (“U.S.”) Department of Transportation (“DOT”), state departments of transportation, and other safety stakeholders agree that the entire 5.9 GHz band is needed to bring the vision of a cooperative transportation system into existence.¹ Now more than ever, the Commission should recognize the wisdom of allocating this 75 MHz of spectrum for ITS technologies, which are on the cusp of being realized and will provide widescale public benefits.

¹ See Letter from Elaine L. Chao, Secretary, U.S. Department of Transportation, to Ajit Pai, Chairman, Federal Communications Commission, at 1 (Nov. 20, 2019) (“Due to the significant potential [V2X] technologies have to reduce these societal crises, it is imperative to the Department that the full 75 MHz of the 5.9 GHz Band is preserved for its existing purposes, including transportation safety and other intelligent transportation services.”); see also Letter from Chris Spear, President & CEO, American Trucking Associations, to Ajit Pai, Chairman, Federal Communications Commission, et al., ET Docket No. 19-138, at 1 (Feb. 5, 2020) (“ATA strongly believes that retaining the full 75 MHz of the 5.9 GHz spectrum for V2X technology to improve safety and reduce traffic congestion and emissions is the right policy outcome.”); Letter from the American Association of State Highway and Transportation Officials, to Ajit Pai, Chairman, Federal Communications Commission, ET Docket No. 19-138, at 1 (Aug. 19, 2019) (“[T]he 5.9 GHz spectrum must be preserved for transportation safety purposes.”).

However, the *NPRM* that the FCC issued in December 2019 ignores the tremendous safety benefits of V2X services and the significant progress that has been made within the transportation ecosystem to develop, test, and deploy ITS technologies within the 5.9 GHz band. The *NPRM*'s proposal to allocate only 30 MHz of spectrum for V2X technologies is wholly insufficient to advance the automotive industry's central goal of reducing deadly crashes on America's roadways, and it all but guarantees that essential safety applications will be lost in the 5.9 GHz band.² Accordingly, the industry—including both DSRC and C-V2X proponents—strongly oppose the FCC's proposal to reallocate 45 MHz of the 5.9 GHz band to unlicensed use. Any Commission action that splinters the 5.9 GHz band between DSRC, C-V2X, and unlicensed Wi-Fi will render critical safety applications inoperable, jeopardizing American competitiveness in the global connected vehicle market, and stranding investments in existing and planned deployments.

A. The Extensive Record Demonstrates the Significant Public Need to Retain the Entire 5.9 GHz Band for Transportation Safety Due to its Life-Saving Potential.

The Commission has amassed a substantial public record on issues related to the 5.9 GHz band through the issuance of several public notices dating back to 2016.³ This extensive public record details the well-documented rate of fatalities from motor vehicle crashes in the United

² *NPRM* ¶ 23.

³ See *Office of Engineering and Technology and Wireless Telecommunications Bureau Seek Comment on 5GAA Petition for Waiver to Allow Deployment of Cellular Vehicle-To-Everything (C-V2X); Technology in the 5.9 GHz Band*, Public Notice, GN Docket No. 18-357 (Dec. 6, 2018) (“5GAA PN”); *Office of Engineering and Technology Requests Comments on Phase I Testing of Prototype U-NII-4 Devices*, Public Notice, ET Docket No. 13-49, DA 18-1111 (Oct. 29, 2018) (“Phase I Testing PN”); *Commission Seeks to Update and Refresh the Record in the “Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band” Proceeding*, Public Notice, 31 FCC Rcd 6130 (2016) (“Refresh PN”).

States,⁴ along with the life-saving potential that V2X services can have on the nation's roadways.

For example:

- According to the National Highway Traffic Safety Administration ("NHTSA"), 36,150 people died in automobile crashes on America's roadways in 2018 alone, equating to approximately 100 deaths per day.⁵
- From 2014 to 2016, automobile crash deaths increased annually, cresting at 37,461 in 2016.⁶
- The National Safety Council estimated that between 2016 and 2018, total roadway deaths exceeded 40,000 annually.⁷
- In addition, NHTSA estimated that in 2017, there were 6,452,000 police-reported traffic crashes, in which 37,133 people were killed and an estimated 2,746,000 people were injured.⁸

The high incidence of roadway deaths and injuries highlights that the need to preserve spectrum for life-saving transportation technologies is more critical than ever before.

The record also shows that important safety applications available through V2X technologies have the potential to drastically reduce motor vehicle crashes and traffic fatalities, and greatly increase roadway safety. For example:

⁴ Comments of ITS America on Phase I Testing, ET Docket No. 13-49, at 3 (filed Nov. 28, 2018) ("ITS Crash Fatalities Comments") (citing *Motor Vehicle Crash Deaths*, Vital Signs, (July 18, 2016), <https://www.cdc.gov/vitalsigns/motor-vehicle-safety/index.html>).

⁵ *Ex Parte* Letter from Safety Groups, ET Docket No. 13-49, GN Docket No. 18-357, at 1 (filed Oct. 28, 2019) ("Safety Groups *Ex Parte*") (citing Press Release, U.S. DOT Announces 2017 Roadway Fatalities Down, U.S. Department of Transportation (Oct. 3, 2018), <https://www.nhtsa.gov/press-releases/us-dot-announces-2017-roadway-fatalities-down>).

⁶ *Ex Parte* Letter from Mothers Against Drunk Driving, ET Docket No. 13-49, at 1 (dated June 21, 2018) ("MADD *Ex Parte*").

⁷ *Vehicle Deaths Estimated at 40,000 for Third Straight Year*, National Safety Council, <https://www.nsc.org/road-safety/safety-topics/fatality-estimates> (last visited Feb. 14, 2020) ("*National Safety Council Webpage*").

⁸ *Traffic Safety Facts*, National Highway Traffic Safety Administration (Sept. 2019), <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812794>.

- NHTSA estimates that human error and human choice are critically involved in 94% of vehicle crashes in the United States.⁹ Therefore, the U.S. DOT has concluded that by providing drivers with timely warnings, V2X could help to significantly limit the number and severity of motor vehicle crashes.¹⁰
- According to studies conducted by researchers at the University of Michigan, in 2018, “[u]p to 8.1 million car crashes and 44,000 deaths could be prevented” with V2X.¹¹ V2X is intended as a supporting countermeasure to reduce these statistics.
- In the technical analysis contained in its 2017 proposed rulemaking mandating vehicle-to-vehicle (“V2V”) technology, NHTSA concluded that V2V capabilities could eliminate 89 percent of light vehicle crashes and 85 percent of associated economic costs.¹²

Retaining ample spectrum for V2X is critical for delivering these immense safety benefits to the public. Accordingly, the Commission should retain the entire 75 MHz of the 5.9 GHz band for transportation safety.

B. Vehicle and Vulnerable Road User Safety Applications Will Be Lost Under the FCC’s Proposal.

The U.S. DOT, the automobile industry, and public safety groups agree that V2X is a pivotal component of ongoing efforts to increase roadway safety. Under the Commission’s *NPRM* proposal, several critical safety applications will be lost for both DSRC and C-V2X.

⁹ *Ex Parte* Letter of the Alliance of Automobile Manufacturers, ET Docket No. 13-49, GN Docket No. 18-357, at 5 (filed June 12, 2019) (“Alliance *Ex Parte*”) (citing *Critical Reasons for Crashes Investigated in the National Motor Vehicle Crash Causation Survey*, National Highway Traffic Safety Administration (February 2015), <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812115>).

¹⁰ Alliance *Ex Parte* at 5.

¹¹ According to studies conducted by researchers at the University of Michigan, in 2018, “[u]p to 8.1 million car crashes and 44,000 deaths could be prevented if the federal government mandated [V2X]” immediately. *Ex Parte* Letter of Michigan Department of Transportation, ET Docket No. 13-49, at 2 (filed May 24, 2018; posted June 15, 2018) (“MDOT *Ex Parte*”).

¹² These capabilities include Forward Collision Warning, Intersection Movement Assist, Left Turn Assist, and Lane Change Warning. *Ex Parte* Letter of the Association of Global Automakers, ET Docket No. 13-49, Attachment Responding to Staff Questions, at 1 (filed June 28, 2017) (“GA Band Plan *Ex Parte*”) (citing *Federal Motor Vehicle Safety Standards; V2V Communications*, Notice of Proposed Rulemaking, 82 Fed. Reg. 3854, 3863 (proposed Jan. 12, 2017)).

Due to the likely interference from unlicensed Wi-Fi, the 10 MHz *potentially* reserved for DSRC would not be usable. Thus, the following safety applications—currently either in use or under development—will be lost for DSRC:

- V2V safety: basic safety message (“BSM”) for crash avoidance applications, remote driving, cooperative driving (exchange of intention and sensor data to enable functions such as cooperative merging, blind spot/lane change warning, cooperative adaptive cruise control, and collective perception enabled by sensor functionality), and the ability of vehicles to obtain information about objects around them located beyond the view of onboard sensors.
- V2I safety: red light violation warning, curve speed warning, stop sign gap assist, and reduced speed and work zone warnings; mobility applications (intelligent traffic signal priority (transit and freight), road weather response traffic information), and public safety emergency communications for first responders.

Similarly, due to the limited spectrum (20 MHz) proposed for 4G LTE C-V2X, 5G enabled C-V2X would not be possible.¹³ 5G goes beyond what current 4G LTE can offer due to a combination of ultra-low latency (a few milliseconds), high data rates (1000 Mbps), and advanced reliability.¹⁴ As noted by 5GAA, an additional 40 MHz of spectrum is required to realize the full potential of C-V2X. If limited bandwidth prevented use of 5G, C-V2X safety applications including vehicle platooning, advanced driving with extended sensors to enable path planning, real-time local updates, and coordinated driving,¹⁵ collective perception, and remote

¹³ 5G Automotive Association, Petition for Waiver to Allow Deployment of Intelligent Transportation System Cellular Vehicle to Everything (C-V2X) Technology, GN Docket No. 18-357, at 5 (filed Nov. 21, 2018).

¹⁴ “The requested waiver will allow for basic C-V2X services, which will support V2V and V2I messages that enable many important safety applications, such as red light warnings, basic safety messages, emergency alerts, and Signal Phase and Timing, Emergency Vehicle Alert, Probe Data Management, Probe Vehicle Data, Signal Request Message, Signal Status Message, Geometric Intersection Description, Traveler Information Message, & others encompassed by the Road Safety Message, to enhance traffic systems and operations.” *Id.* at 21-22.

¹⁵ *5G NR Based C-V2X*, Qualcomm, <https://www.qualcomm.com/media/documents/files/5g-nr-based-c-v2x-presentation.pdf> (last visited Mar. 2, 2020).

driving would be lost. Other 5G C-V2X benefits include supporting high vehicles speeds (up to 500 km/h, 310 mph, relative speeds) and high-volume data sharing between many vehicles and infrastructure, particularly for high vehicle density deployments. The FCC should make ample spectrum available for V2X to ensure that these safety applications can be delivered to the American public.

Reallocating 45 MHz of spectrum, or four of the seven channels in the 5.9 GHz band, as the FCC has proposed, will almost certainly ensure that the aforementioned safety applications will be lost in the U.S. market.¹⁶ Research has shown that at least 47 MHz of spectrum is needed to provide safety critical communications to vehicle and roadway travelers including pedestrians, cyclists, and other vulnerable road users in typical urban scenarios and 77 MHz is needed in more challenging urban scenarios.¹⁷ In densely congested areas, diminished spectrum could

¹⁶ All seven channels of the 5.9 GHz band are needed for V2X safety services. In addition to the basic safety message, these channels support the Signal Phase and Timing Message (this can be used to provide red light warnings for operators); the Map Data Message (this can be used for intersection movements and curve speed warnings); RTCM corrections (this is necessary for V2X positioning accuracy); the Personal Safety Message (this is used to avoid pedestrians, cyclists, and road workers); the Signal Request Message (this can be used to provide transit priority messages for emergency vehicles); the Signal Status Message (this can be used to allow emergency vehicles to communicate with other connected road users); the Traveler Information Message (this transmits road condition alerts to operators); the NMEA corrections message (this message improves V2X positioning accuracy); the Emergency Vehicle Alert Message; the Probe Data Management Message; the Probe Vehicle Data Message (this message provides information to operators about vehicle functionality issues); the Road Side Alert Message; the Common Safety Request Message; and the Intersection Collision Avoidance Message. GA Band Plan Ex Parte, Attachment Responding to Staff Questions, at 1-3.

¹⁷ *Perspectives of the European Automotive Industry on Future C-ITS Spectrum Needs for Cooperative, Connected and Automated Driving*, European Automobile Manufacturers Association and European Association of Automotive Suppliers, at 3 (Nov. 20, 2019) (“ACEA/CLEPA Study”). See also *Road Safety and Road Efficiency Spectrum Needs in the 5.9 GHz for C-ITS and Cooperative Automated Driving*, Car2Car Communication Consortium, at 20 (Feb. 28, 2020) (“In the United States, the Car2Car Consortium agrees that the full 75 MHz are necessary for safety-based applications for Vehicle-to-Person, Vehicle-to-Vehicle, and Vehicle-to-Infrastructure.”)

exacerbate the likelihood that priority basic safety messages would be delayed or suppressed by other uses in the band. Moreover, ongoing testing has demonstrated that vehicle-to-infrastructure and vehicle-to-person use cases, such as cooperative driving and collective perception, will require additional warning messages, and therefore more spectrum.¹⁸

Under either scenario proposed by the FCC's *NPRM*, whether designating one 20 MHz channel or a combined total of 30 MHz for V2X technologies, the volume of spectrum allocated is insufficient to support V2V and V2I safety applications, as well as other V2I mobility applications and public safety communications in the 5.9 GHz band. In addition, because the Commission proposes to reallocate over half of the 5.9 GHz band for unlicensed use, the remaining spectrum for transportation safety may be rendered unusable due to adjacent channel interference.¹⁹ As shown in Figure 1, under these circumstances, the 20-30 MHz left for transportation safety would be inadequate to support the majority of V2V and V2I safety applications in the band. Many of the safety benefits and the full potential of V2X would be lost for the traveling public.

¹⁸ Cooperative driving enhances safety and efficiency by allowing all vehicles and roadside units to share data obtained from local sensors and nearby vehicles to facilitate coordination of direction and movement. Meanwhile, collective perception enables V2X-equipped vehicles and infrastructure to send information about non-equipped road users to other V2X users, thereby allowing detection of non-equipped vehicles, persons, and infrastructure. *See ACEA/CLEPA Study* at 3.

¹⁹ *See Preliminary Testing: Out-of-Channel Interference (Out-of-Band-Emissions)*, U.S. Department of Transportation, at 1 (Dec. 6, 2019) <https://cms8.dot.gov/sites/dot.gov/files/docs/research-and-technology/360181/oobe-energy-59-safety-band-final-120619.pdf> (“*Preliminary Testing*”); *see also* Section III.A.

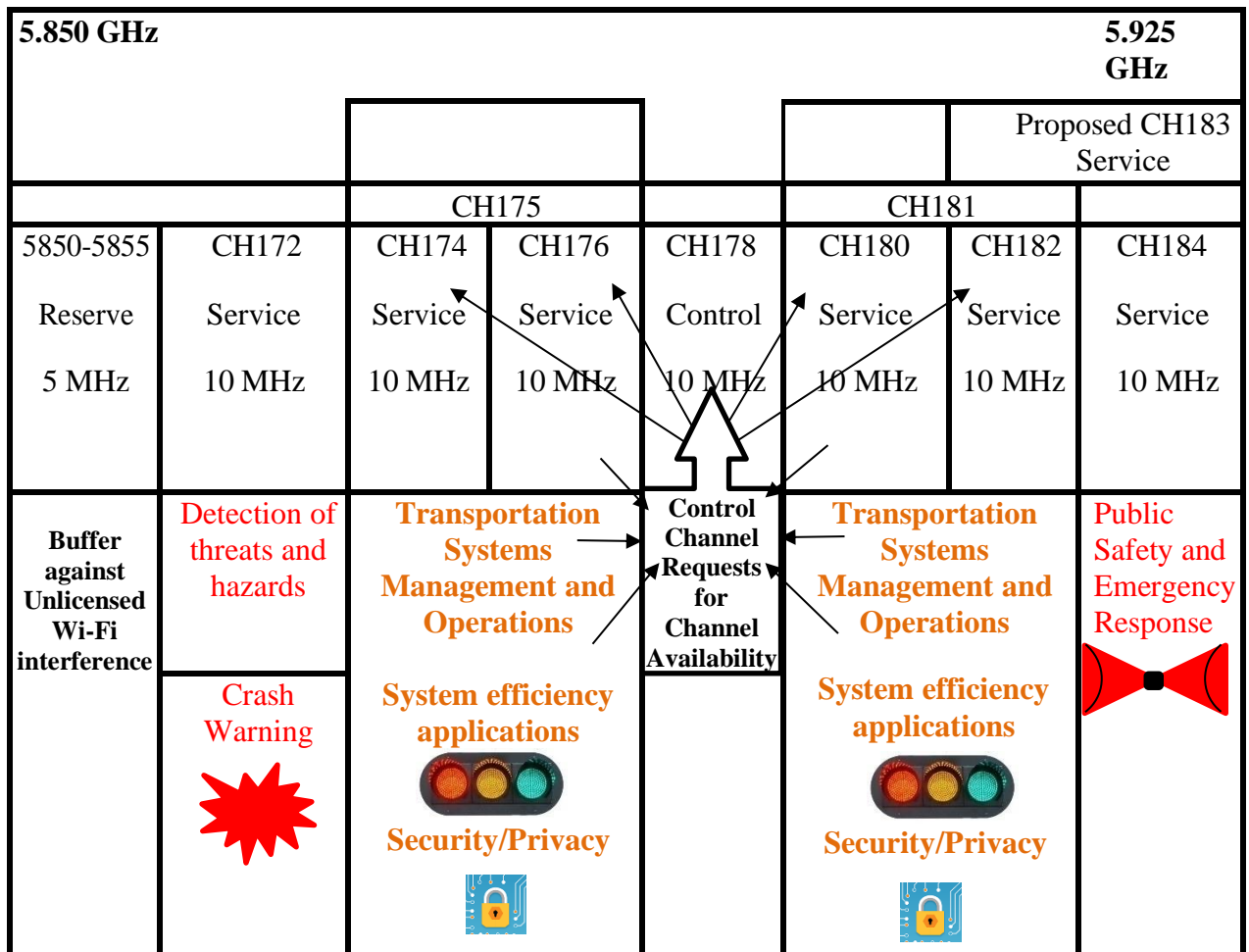


Figure 1

Although the *NPRM* suggests that sensor technology, such as long-range radar systems, optical cameras, cell phone applications, sonar, and LiDAR can provide sufficient substitutes for all V2X applications, this is not accurate.²⁰ Specifically, sensors and cameras require direct line-of-sight and “cannot provide a 360-degree awareness for the driver/vehicle within a 300-1000 meter range, including when buildings, foliage and other blockers (*e.g.*, a truck blocking a car)

²⁰ *NPRM* ¶ 4.

are in the way.”²¹ In contrast, V2X applications are designed to provide warnings in scenarios where the capability of sensor suites and cameras may be limited, such as vehicles approaching each other at intersections.²² In responding to the U.S. DOT’s 2016 V2V NPRM, the auto industry identified several instances where V2V applications could provide warnings that vehicle-based sensors could not, including the ability of vehicles to communicate with one another to provide high-level driver assistance, V2V warning systems that would enhance onboard safety systems, and communications that are critical for self-driving vehicles to avoid collisions.²³

While it is true that safety features are increasingly being integrated into cellphone apps, such as the Waze driving app, there is no ready substitute that offers the same benefit as V2X. Waze provides crowdsourced information to its users about potential hazards along the roadway. However, the onus is on users to input this information, and such reporting is susceptible to substantial inaccuracies due to amateur hazard reporting or even users “gaming” the app for mischievous or malicious purposes.²⁴ Waze also cannot compare to the public safety benefits promised by V2X, as there is evidence driving applications result in more traffic and safety

²¹ *Concerns with the Draft FCC NPRM: Use of the 5.850-5.925 GHz Band [ET Docket No. 19-138]*, U.S. Department of Transportation, at 3 (Dec. 5, 2019), <https://www.transportation.gov/sites/dot.gov/files/docs/research-and-technology/359811/preliminary-technical-assessment-fcc-59-ghz-nprm-05dec2019-final.pdf>.

²² *Id.* at 3.

²³ *Id.* at 3, n.4.

²⁴ Tala Salem, *Why Some Cities Have Had Enough of Waze*, U.S. News & World Report (May 7, 2018, 1:42 PM), <https://www.usnews.com/news/national-news/articles/2018-05-07/why-some-cities-have-had-enough-of-waze>. (In response to such “shortcut” reporting, at least one resident used the Waze app to report fake accidents and traffic jams in his neighborhood until the app company blocked him).

issues.²⁵ V2X entails seamless, hands-off, secure communications based on real-time information, not user reports. If the Commission substantially reduces the spectrum available for V2X, the safety applications and benefits that V2X engenders will be lost and not readily replaced.

C. V2X Promises Numerous Other Benefits, Including Economic, Environmental, and Transportation Efficiencies.

In addition to the abovementioned safety benefits, V2X services also promise several other valuable improvements, including transportation efficiency, environmental preservation, economic benefits, and support for vehicle automation. Preserving and designating the entire 5.9 GHz band for V2X will help unleash these benefits and serve the public interest for generations to come.

Transportation Efficiency. Transportation is the lifeblood of the economy. An efficient national transportation system enables businesses to move people and goods in order to sustain and grow the American economy while remaining competitive in the global marketplace. V2X connectivity can boost transportation efficiency while decreasing fuel consumption.²⁶ In 2018, traffic jams cost the United States \$87 billion in lost productivity.²⁷ Automation through V2V and V2I integration allows vehicles to travel in fleets, thereby improving aerodynamic conditions

²⁵ For example, local governments complain that Waze’s crowdsourcing technology allows users to suggest “shortcuts” on side roads, and that this has led to heavily trafficked residential streets. *Id.*

²⁶ Alliance Ex Parte at 5.

²⁷ *Id.* at 5 (citing Phil LeBeau, *Traffic jams cost US \$87 billion in lost productivity in 2018, and Boston and DC have the nation’s worst*, CNBC (Feb. 12, 2019, 12:39 PM), <https://www.cnbc.com/2019/02/11/americas-87-billion-traffic-jam-ranks-boston-and-dc-as-worst-in-us.html>).

and decreasing travel times.²⁸ Moreover, weather and traffic conditions can be provided to vehicles connected to the network, allowing for optimal traffic planning and routing.²⁹ Any socio-economic analysis of re-allocating the 5.9 GHz band away from ITS services should carefully consider the implications that action may have on the automotive industry's ability to deliver the needed transportation efficiencies.

Environmental Preservation. The above improvements to transportation efficiency also have clear environmental benefits. In 2017 alone, 3 billion gallons of fuel were wasted idling in traffic across the United States.³⁰ V2V and V2I integration will allow vehicles to travel in fleets or “platoon,” decreasing carbon dioxide emissions for roadway freight alone by eight to 16 percent.³¹ Additionally, real-time access to weather and traffic condition information will enable more efficient traffic flow, not to mention a corresponding reduction in carbon dioxide emissions caused by traffic congestion.

Economic Benefits. In addition to V2X's potential to save on the costs of lost productivity (*e.g.*, time lost commuting or idling in traffic jams), V2X also engenders considerable savings from automobile crash costs. NHTSA estimates that crashes cost the U.S.

²⁸ Comments of Panasonic Corporation of North America, GN Docket No. 18-357, at 3 (filed Jan. 29, 2019) (“Panasonic Petition Comments”) (citing Comments of Maryland Department of Transportation, ET Docket No. 13-49, at 1-2 (filed Nov. 26, 2018)).

²⁹ Winning the Race to 5G and the Next Era of Technology Innovation in the United States: Before the U.S. S. Comm. on Commerce, Sci., & Transp., Winning the Race to 5G and the Next Era of Technology Innovation in the United States, 116th Cong. 5 (statement of Shailen P. Bhatt, President & CEO, The Intelligent Transportation Society of America) (“*ITS Testimony*”).

³⁰ Panasonic Petition Comments at 2.

³¹ *Id.* at 3-4 (citing *Platooning: Driving the Safety of the Commercial Fleet*, APTIV (Sep. 12, 2018), available at <https://bit.ly/2SAGJVU>).

economy \$836 billion each year.³² By 2051, however, the agency calculates that V2X could prevent 600,000 vehicular crashes, reducing costs for operators and taxpayers by a combined \$53-\$71 billion a year.³³ V2X can also help increase the mobility of people, goods, and services. V2X's ability to enhance automated vehicle capabilities can also be a critical factor in expanding mobility and helping to transport persons with disabilities who would not otherwise be capable of operating an automobile.³⁴

Support for Vehicle Automation. Finally, the *NPRM* proposal leaves no opportunity for the evolution of V2X technologies, which are poised to support vehicle automation. The transportation ecosystem is on the cusp of realizing these innovations. V2X technologies can enhance the safety benefits of automated vehicles, as V2X applications offer more capabilities than what is possible with line-of-sight sensors and high-definition maps. For instance, V2X applications will enable coordination with pedestrians, cyclists, and other vulnerable road users.

V2X will also make cooperative driving possible, allowing automated vehicles to exchange information about intended paths to make coordinated decisions on driving behaviors such as merging, lane change, and overtaking. Cooperative driving technology will be a game-changer for automated applications. The Society of Automotive Engineers (“SAE”) already has developed six standards for cooperative driving, ranging from Level 0, with features that assist driving operations, including steering, breaking, and acceleration, to Level 5, providing complete

³² Alliance Ex Parte at 5 (citing *The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised)*, National Highway Traffic Safety Administration, at 10 (revised May 2015), <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812013>).

³³ Panasonic Petition Comments at 3 (citing U.S. Department of Transportation, National Highway Traffic Safety Administration, *Federal Motor Vehicle Safety Standards: V2V Communications*, Notice of Proposed Rulemaking, 82 Fed. Reg. 3854, 3863 (Jan. 12, 2017)).

³⁴ Nearly one in five persons in the United States has a disability. *ITS Testimony* at 5.

automation under all conditions.³⁵ In 2020, the SAE Committee that defined the levels of automation voted unanimously to approve J3216, a standard to define classes of cooperative automation. The standard recognizes that vehicles can cooperate to enhance automated driving functionality or enable new functionality that would not otherwise be possible, *e.g.* platooning, decision-making for an ambiguous right-of-way, and coordinated intersection departure. Work is also underway on the CARMA Platform, an open source software platform that was initiated by the Federal Highway Administration in 2014 “to enable the testing and evaluation of cooperative automation concepts” for improving safety and increasing infrastructure efficiency.³⁶ These innovations are poised to support the next frontier of our automotive future.

Collective perception is another feature that would be of great benefit to automated vehicles and would not be possible without connectivity. Collective perception is achieved via V2V or V2I communication on information beyond the view of a vehicle’s onboard sensors. This enables vehicles to have true “look-ahead” knowledge of traffic conditions, weather, construction, and other obstacles in the vehicle’s path. Additionally, high-powered public safety communications, including with first responders, would not be possible if the Commission’s *NPRM* moves forward. These examples demonstrate that without V2X capability, automated vehicles would not be able to exchange the required information to fulfill safety, transportation

³⁵ Jennifer Shuttleworth, *SAE Standards News: J3016 automated-driving graphic update*, Society of Automotive Engineers (Jan. 7, 2019), <https://www.sae.org/news/2019/01/sae-updates-j3016-automated-driving-graphic>.

³⁶ *CARMA Platform*, U.S. Department of Transportation, Federal Highway Administration (revised June 25, 2019), <https://cms7.fhwa.dot.gov/research/research-programs/operations/carma-platform> (“*CARMA Page*”). CARMA is divided into three phases, with CARMA 2 now available on GitHub for use, while CARMA 3 – which will enable communication between cloud services, operators, and other road users – is currently under development. *Id.*; *USDOT FHWA STOL*, GitHub, <https://github.com/usdot-fhwa-stol> (last visited Mar. 1, 2020).

efficiency, economic, and environmental goals. However, under the FCC's proposal each of the capabilities listed above would be lost, as more than 30 MHz of spectrum is needed to implement these applications.

The U.S. DOT has emphasized that V2X can provide an important complement to vehicle automation by enabling communication between operators, vehicles, infrastructure, and other road users. With V2X, the integration of low-latency communications can enhance the vehicle's sensing capabilities with respect to the surrounding roadway and infrastructure, further expanding the operational design domain capabilities and the cooperative potential of automated vehicles. V2X will be an integral component of a modern twenty-first century transportation system. For the full automated future to be realized, however, substantial amounts of information must be communicated by V2X systems, and the entire 5.9 GHz band must be preserved to accommodate such communications.

D. Global Competitiveness Will Be Sacrificed if 45 MHz of the Safety Spectrum Band is Given Away.

Designating the entire 5.9 GHz band for transportation safety advances public safety and U.S. leadership in this vital and growing area of technology. The auto industry, state departments of transportation, and other stakeholders are on the precipice of realizing the potential of the band through planned deployments and future automobile model rollouts. These current and future capabilities will require all 75 MHz available in the 5.9 GHz band to support the United States' connected and automated driving future.

The Commission should not stymie innovation which is already in progress and stands to put the U.S. at the forefront of the connected vehicle landscape. Just as Wi-Fi has grown since

the 5.9 GHz band was allocated for V2X technologies,³⁷ so have DSRC, 4G LTE C-V2X, and even developmental 5G protocols designed to enhance communications between connected vehicles.³⁸ The low-latency characteristics of V2X direct communication can be leveraged to augment 5G, and further technological capabilities such as 5G New Radio V2X.³⁹ In addition, the IEEE Next Generation V2X (“NGV”) initiative, which will provide a new standard of DSRC connectivity through improved communication performance and new use cases for localization, is well underway and promises great innovation.⁴⁰ NGV will be interoperable with all DSRC devices as well as be capable of fair coexistence with DSRC devices in the same channel, mitigating the need for band fragmentation, while offering similar benefits to 5G C-V2X.⁴¹ These current and future capabilities will require all 75 MHz available in the 5.9 GHz band to support the United States’ connected and automated driving future. These innovations must continue to ensure American leadership and global competitiveness.

The United States should not surrender global leadership due to a lack of spectrum for V2X. The United States is not alone in developing V2X and automated driving technologies in the 5.9 GHz band as the band is largely harmonized internationally for V2X usage due to its unique characteristics. To best position the United States as the world leader in connected and

³⁷ *NPRM* ¶ 14.

³⁸ Panasonic Petition Comments at 7-8.

³⁹ *Ex Parte* Presentation of the Association of Global Automakers, ET Docket No. 13-49, GN Docket No. 18-357, Attachment Association of Global Automakers Comments on Docket DOT-OST-2018-0210, at 4 (filed Mar. 29, 2017) (“GA V2X Capabilities Ex Parte”).

⁴⁰ *Id.* at 3.

⁴¹ Comments of IEEE 802 LAN/MAN Standards Committee, GN Docket No. 18-357, at 4 (filed Jan. 17, 2019).

automated vehicle technology, the Commission must ensure adequate spectrum is available for V2X services.

Around the world, countries are realizing the value of allocating sufficient spectrum to support the life-saving capabilities of V2X. Although the Commission notes that Europe has designated a 30 MHz spectrum block for V2X at 5.875-5.905 GHz,⁴² studies show that amount of spectrum is insufficient to support protecting vulnerable road users, cooperative driving, platooning, sensor sharing and remote driving.⁴³ The Electronic Communications Committee of the European Conference of Postal and Telecommunications Administrations (“CEPT/ECC”) has proposed adding an extension band for V2X at 5.905-5.925 GHz and a proposed band for non-safety V2X at 5.855-5.875 GHz.⁴⁴ CEPT/ECC has also proposed adding an additional 2 GHz in the 63 GHz band for future transportation safety and efficiency projects.⁴⁵ Japan has found that 10 MHz for V2X is not nearly enough to unlock the technology’s life-saving benefits: the 10 MHz cannot support communications with pedestrians, non-BSM infrastructure-related safety applications and sensor sharing to support automation. This limitation should be alarming for other stakeholders and the Commission to consider when it comes to balancing the public interest in allocating the 75 MHz within the 5.9 GHz band.

On the other hand, China has already allocated 20 MHz in the 5.9 GHz band solely for C-V2X testing,⁴⁶ and has announced a commitment to enable a 5G V2X future for China’s

⁴² *NPRM* ¶ 21.

⁴³ GA Band Plan Ex Parte, Attachment Responding to Staff Questions at 2-3.

⁴⁴ *Id.* at 6-7.

⁴⁵ *Id.*

⁴⁶ *See id.*; *see also U.S. risks falling behind China on robocars, Qualcomm says*, Automotive News: China (Aug. 1, 2019), <https://www.autonews.com/china/us-risks-falling-behind-china-robocars-qualcomm-says>.

transportation ecosystem.⁴⁷ Additionally, Australia has allotted a 70 MHz block in the 5.9 GHz band for various V2X capabilities, including road safety and transportation efficiency.⁴⁸ If the FCC proposal becomes reality, the US would be severely limited in its ability to compete on roadway safety, economic productivity and technological innovation. Given the growing momentum for V2X around the world, it is crucial that the Commission preserve the entire 5.9 GHz band to guarantee U.S. leadership in roadway safety, connected vehicle technology, and an automated mobility future.

E. The Entire 5.9 GHz Band Also Should Be Retained in Light of Existing and Ongoing Deployments by State Governments, Automakers, and Other Stakeholders.

The public is on the verge of fully realizing the benefits of V2X in the 5.9 GHz band, and the Commission should not counteract this momentum now. The auto industry, state departments of transportation, law enforcement, and other stakeholders are hard at work on existing and planned deployments using DSRC and C-V2X, developing new technologies, enhancing connectivity across the mobility ecosystem, and mapping the future of automated vehicles. Although the full potential of the 5.9 GHz band is yet to be fully realized, removing over half of the band now would strand both private and public sector investments in life-saving V2X capabilities.

V2X deployments are already underway. State and local governments have deployed and piloted V2X projects in over half of the 50 states, with numerous other deployments planned in

⁴⁷ *The National Development and Reform Commission (NDRC) Circulates Draft of Smart Car Strategy*, Hong Kong Lawyer (Apr. 4, 2018), <http://www.hk-lawyer.org/content/national-development-and-reform-commission-ndrc-circulates-draft-smart-car-strategy>.

⁴⁸ GA Band Plan Ex Parte, Attachment Responding to Staff Questions at 7.

the coming years.⁴⁹ As of December 6, 2019, there were 35 states with active 5.9 GHz V2X licenses,⁵⁰ and there are currently 66 planned and 57 operational V2X projects across the country using the 5.9 GHz band.⁵¹ Moreover, approximately 500 additional applications for licenses for DSRC Roadside Unit licenses in the 5.9 GHz band were pending with the Commission before it issued its *NPRM* and suspended consideration of future applications.⁵² Additionally, the U.S. DOT has recently invested in these endeavors, awarding a \$20 million BUILD Transportation Grant to Colorado to create a commercially-scaled V2X project that sends “safety and mobility-critical messages directly to drivers through infrastructure-to-vehicle (I2V) communication as well as notify[ing] CDOT of crashes or hazards on the road through [V2I] communication.”⁵³

⁴⁹ See, e.g., Panasonic Petition Comments at 4-5 (“[I]n August 2018, Panasonic teamed with Ford and Qualcomm to begin the first large-scale implementation of C-V2X technology. This project connects vehicles and roadways with a regional traffic management center in Denver, enabling a new level of data-driven situational awareness to roadway operators that will enable a dramatic improvement of driver safety on the road.”); Comments of New York City Department of Transportation, ET Docket No. 13-49, at 1 (filed Dec. 13, 2018) (“NYC launched the Vision Zero initiative to reduce and eliminate traffic deaths in 2014. In the years since, fatalities have declined 26%, including a 42% decline in pedestrian fatalities.”); *Ex Parte* Letter of Utah Department of Transportation, ET Docket No. 13-49, at 1 (filed June 25, 2018) (“We have DSRC systems operationally deployed today, and are actively expanding those deployments.”); MDOT *Ex Parte* at 1 (“MDOT is actively deploying infrastructure and developing V2I applications to support MDOT’s most important goal of saving lives.”).

⁵⁰ *States with Active 5.9 GHz Intelligent Transportation Services (ITS) Licenses*, U.S. Department of Transportation, (Dec. 6, 2019), <https://www.transportation.gov/research-and-technology/states-active-59-ghz-intelligent-transportation-service-its-licenses>.

⁵¹ *The 5.9 GHz Band: Where is the Safety Band Being Used?*, U.S. Department of Transportation (updated Feb. 7, 2020), https://www.transportation.gov/sites/dot.gov/files/2020-02/59-fact-sheet-deployment-map_0.pdf.

⁵² Letter from Peter DeFazio, U.S. House of Representatives, et al. to Chairman Ajit Pai, Chairman, Federal Communications Commission et al., (Jan. 22, 2020) <https://transportation.house.gov/imo/media/doc/2020-01-22%20Full%20TI%20Letter%20to%20FCC.pdf>.

⁵³ Panasonic Petition Comments at 4 (citing *U.S. Transportation Secretary Elaine L. Chao Announces \$1.5 Billion in BUILD Transportation Grants to Revitalize Infrastructure Nationwide*, U.S. Department of Transportation (Dec. 11, 2018),

Last fall, Secretary Chao announced \$60 million in federal grant funding to ADS Demonstration Grant winners, including connected vehicle demonstrations.⁵⁴ More recently in January of 2020, Secretary Chao announced \$38 million for the First Responder Safety Technology Pilot Program to help equip emergency response vehicles and key infrastructure with V2X technology to save lives of first responders rushing to aid in emergencies.⁵⁵ These demonstrations complement the work underway for many years by the Federal Highway Administration (FHWA) to develop the CARMASM Platform, an open source software designed to enable V2X cooperative driving and increase transportation safety and efficiency.

The automotive industry is engaged in V2X deployment as well, with several manufacturers making deployment commitments and planning to roll out V2X-capable vehicles for upcoming model years. For example:

- Ford has committed to deploying C-V2X in its 2022 model class.⁵⁶

<https://www.transportation.gov/briefing-room/us-transportation-secretary-elaine-l-chao-announces-15-billion-build-transportation>).

⁵⁴ *U.S. Secretary of Transportation Announces Automated Driving System Demonstration Grant Winners*, U.S. Department of Transportation (Sept. 18, 2019)

<https://www.transportation.gov/briefing-room/us-secretary-transportation-announces-automated-driving-system-demonstration-grant>.

⁵⁵ Press Release, U.S. Transportation Secretary Elaine L. Chao Announces New Initiatives to Improve Safety on America's Roads, U.S. Department of Transportation (Jan. 15, 2020),

<https://www.transportation.gov/briefing-room/us-transportation-secretary-elaine-l-chao-announces-new-initiatives-improve-safety>; *First Responder Safety Pilot Program*, U.S. Department of Transportation, https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/first_responder_safety_technology_pi_lot_program011620.pdf.

⁵⁶ Letter from James P. Hackett, President & CEO, Ford Motor Company, to Ajit Pai, Chairman, Federal Communications Commission, ET Docket No. 19-138, at 1 (Nov. 21, 2019).

- General Motors also committed to offering V2X in 2023 Cadillac crossovers before extending the technology to all Cadillac models thereafter,⁵⁷
- Although Honda has remained technologically neutral, it partnered with the Ohio Department of Transportation and Ohio State University on the installation of DSRC roadside units to test its SAFE SWARM V2X technology in 2018.⁵⁸
- Toyota has been a global leader on V2X and has deployed more than 100,000 DSRC-equipped Toyota and Lexus vehicles in Japan.⁵⁹
- Volkswagen has launched V2X capabilities such as assisted driving and collective intelligence in its new Golfs in Europe.⁶⁰

The software industry is also innovating with respect to C-V2X technologies.⁶¹ These commitments and efforts represent a clear sign of intended spectrum usage, demonstrated technological maturity, and highlight the progress that the automotive industry had made to bring DSRC to the point of widespread deployment and engage in innovation on C-V2X, which stands

⁵⁷ Letter from Paul Hemmersbaugh, Chief Counsel and Policy Director, General Motors, to Marlene H. Dortch, Secretary, Federal Communications Commission, ET Docket No. 13-49, at 1 (July 13, 2018).

⁵⁸ Comments of American Honda Motor Co., Inc., GN Docket No. 18-357, at 2-3 (filed Jan. 25, 2019) (“Honda is testing SAFE SWARM as part of the 33 Smart Mobility Corridor . . . in partnership with the Ohio Department of Transportation and the Ohio State University, among others. Members of Honda’s team in Ohio will equip their vehicles with communications technology to ‘speak’ with both other vehicles and the infrastructure to achieve the goals of SAFE SWARM.”)

⁵⁹ *Ex Parte* Letter of Toyota Motor North America, Inc., ET Docket No. 13-49, at 2-3 (filed Apr. 27, 2018).

⁶⁰ Stephen Shankland, *Volkswagen's new Golf cars will use V2X to talk to each other wirelessly*, CNet (Oct. 28, 2019, 2:32 P.M.), <https://www.cnet.com/roadshow/news/volkswagen-new-golf-cars-will-use-v2x-to-talk-to-each-other-wirelessly/>; *New Golf01 is Launched with High-Tech Standard Equipment*, Volkswagen (Nov. 26, 2019) <https://www.volkswagen-newsroom.com/en/the-new-golf-international-vehicle-presentation-5609/new-golf-is-launched-with-high-tech-standard-equipment-5617>.

⁶¹ For example, Savari, Inc. announced market launch of its V2X Software Stack in two leading global automotive manufacturers and one OEM in Asia beginning in 2020. *Two Leading Global Automotive Manufacturers Commit to Implement Savari V2X Software in 2020*, Savari, Inc. (Jan. 6, 2020) <https://www.prnewswire.com/news-releases/two-leading-global-automotive-manufacturers-commit-to-implement-savari-v2x-software-in-2020-300981415.html>.

to have a high market impact. It is noteworthy that this activity has occurred despite uncertainty about the Commission's plan for the 5.9 GHz band.⁶²

The Commission's proposal would also disrupt the years-long product development cycles that have been made in reliance on the existing 5.9 GHz band plan. While DSRC is the predominant V2X technology currently being deployed today, some automakers have begun development cycles utilizing C-V2X in future vehicle models. If the Commission takes the actions it proposes in the *NPRM* and reallocates most of the 5.9 GHz band to Wi-Fi, it would strand these infrastructure investments and disrupt product development, thereby directly slowing the pace toward the connected vehicle future and undermining the safety improvements that these products could provide.

III. THE FCC'S PROPOSED BAND PLAN WOULD BE TANTAMOUNT TO ELIMINATING V2X.

A. The FCC's Proposal Ignores the Risk of Harmful Interference to V2X Technologies.

The Commission's proposed band plan fails to ensure that V2X communications are adequately protected from harmful interference, and in so doing, effectively forecloses use of the band for any V2X technology. It is axiomatic that any band plan that accommodates multiple technologies must avoid harmful interference. Given the life-saving value of V2X and the importance of reliability, it is essential that V2X services in the 5.9 GHz band are adequately protected from adjacent unlicensed operations. Whether the Commission adopts the Auto

⁶² For example, Toyota indefinitely suspended its plans to launch DSRC in the U.S. in April 2019 due in part to a lack of Commission support to "preserve the 5.9 GHz band for DSRC." David Shepardson, *Toyota abandons plan to install U.S. connected vehicle tech by 2021*, Reuters (Apr. 26, 2019, 3:06 PM), <https://www.reuters.com/article/us-autos-toyota-communication/toyota-abandons-plan-to-install-u-s-connected-vehicle-tech-by-2021-idUSKCN1S2252>.

Innovators' recommendation for exclusive use of the 5.9 GHz band for V2X or repurposes some of the spectrum for other services, it must ensure that V2X services are prioritized and insulated from interference and capable of delivering expected benefits to consumers and the traveling public.

As an initial matter, the success of V2X in protecting public safety depends on operating in an environment without harmful interference. Successful functioning of V2X requires the Basic Safety Message to be transmitted 10 times per second. This constant communication between and among vehicles and infrastructure plays a critical role in reducing motor vehicle crashes. It is essential that the Commission's rules enable V2X transmissions absent harmful interference.

In addition, the Commission's proposal to reallocate the lower 45 MHz of the 5.9 GHz band for unlicensed Wi-Fi will result in pervasive harmful interference to V2X communications, in violation of the Commission's rules. The FCC would allow unlicensed operations to operate in the lower 45 MHz of the 5.9 GHz band and reserve the adjacent 30 MHz of the band for V2X.⁶³ The Auto Innovators raise harmful interference not as a specter, but as a certainty. The FCC has yet to outline exactly how its proposal would adequately protect V2X communications and services. The U.S. DOT conducted initial testing on the ramifications of the FCC's proposed band plan and concluded that "it is clear that interference will occur."⁶⁴ The testing showed a high potential for adjacent band interference, with out-of-band emissions extending "20 MHz to either side," and energy leaks into adjacent channels.⁶⁵

⁶³ *NPRM* ¶ 11.

⁶⁴ *Preliminary Testing*, at 1.

⁶⁵ *Id.* at 1, 4.

NHTSA testing on cross-channel interference also raises red flags about the Commission’s proposed band plan. NHTSA’s testing showed significant cross channel interference from unlicensed operations to the proposed DSRC segment of the band, with “potentially performance disrupting interference found up to a range of up to 400m.”⁶⁶ Testing covered a variety of Wi-Fi signal bandwidths, and all showed varying levels of harmful interference. The testing likely even *understates* the level of interference to V2X as:

- Testing took place under conservative power level conditions (*e.g.*, the Wi-Fi power levels used in testing were below the highest power level the Commission proposes in the *NPRM*);⁶⁷
- The study only tested vehicles 75 meters apart,⁶⁸ although real world scenarios would have vehicles further apart or the DSRC transmission traveling on a non-line-of-sight path;
- Testing did not include moving vehicles,⁶⁹ which could be subject to worse interference as the vehicles pass the Wi-Fi transmitters; and
- Testing did not measure interference from non-802.11ac Wi-Fi devices,⁷⁰ which would also be permitted in the band under Part 15 of the Commission’s rules.

⁶⁶ *DSRC and Wi-Fi Baseline Cross-channel Interference Test and Measurement*, National Highway Traffic Safety Administration (Jan. 2020) https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/dsrc_and_wi-fi_baseline_cross-channel_interference_test_and_measurement_tag.pdf (“NHTSA DSRC and WiFi Baseline Test”).

⁶⁷ The tests were conducted with 36 dBm EIRP but fixed point-to-point U-NII devices could operate at power levels of 62 dBm EIRP using 5G antennas that have 32 dBi gain. *See id.* at 3; *NPRM* proposed rule § 15.407(a)(4) (“fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.”).

⁶⁸ NHTSA DSRC and WiFi Baseline Test at 3.

⁶⁹ *Id.*

⁷⁰ *Id.* at 2.

Despite potentially understating the interference effects, the results of testing were clear—unlicensed devices operating in the 5.9 GHz band will cause pervasive harmful interference to V2X communications.

Taken together, these results show that the Commission’s proposed band plan would conflict with the Commission’s rules on causing interference. Section 15.5(b) specifies that “[o]peration of an intentional, unintentional, or incidental radiator is subject to the conditions that no harmful interference is caused.”⁷¹ Section 15.3(m) of the Commission’s rules defines “harmful interference” as “[a]ny emission, radiation or induction that endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunications service.”⁷² Unlicensed devices operating in the 5.9 GHz band stand to create harmful interference that would endanger the functioning of V2X—a safety service. The Commission should recognize the necessity of protecting transformative, life-saving V2X communications services from harmful interference from unlicensed transmission, and revise its proposed band plan to keep unlicensed device transmissions on frequencies adequately removed from V2X channels.

The proposal’s failure to protect V2X is particularly troubling given the potential for additional harmful interference that might result from the Commission’s proposal for the 5.925-7.125 GHz (“6 GHz”) band.⁷³ When the Commission proposed to modify its rules to expand unlicensed use in the 6 GHz band, commenters including the Association for Global Automakers, the Alliance of Automobile Manufacturers, 5GAA, and Qualcomm explained that

⁷¹ 47 C.F.R. § 15.5(b).

⁷² *Id.* § 15.3(m).

⁷³ *Unlicensed Use of the 6 GHz Band*, Notice of Proposed Rulemaking, 33 FCC Rcd 10496 (2018).

the Commission’s out of band emission (“OOBE”) limit would not adequately protect V2X operations in the 5.9 GHz band.⁷⁴ If the Commission adopts its 6 GHz proposal without imposing additional limits on unlicensed use in that band, V2X communications will suffer from unlicensed device interference both immediately above and immediately below the V2X allocation. The Commission’s band plan already proposes reducing the amount of spectrum for V2X services to 30 MHz. The adjacent channel interference issues—from both directions—may render even this reduced amount of spectrum unusable for both DSRC and 4G LTE C-V2X.

If guard bands are instituted to reduce the potential for adjacent band interference, spectrum for the guard bands should not be taken from the 30 MHz of spectrum allocated for V2X. In some cases, OOBE limits alone have been found insufficient to protect operators in adjacent bands, and the Commission has incorporated guard bands to the band plan.⁷⁵ While guard bands may alleviate the risk of interference, the spectrum allocated to V2X should not be further reduced. Requiring unlicensed devices to incorporate a dynamic frequency selection (“DFS”) capability may also help by enabling such devices to detect the presence of neighboring V2X signals and mitigate the potential for adjacent channel interference. The Commission already requires DFS capability for some unlicensed devices using the 5 GHz band.⁷⁶ As the

⁷⁴ See, e.g. Reply Comments of the Association of Global Automakers, Inc., ET Docket No. 18-295, GN Docket No. 17-183, at 4-5 (filed Mar. 18, 2019); Reply Comments of the Alliance of Automobile Manufacturers, ET Docket No. 18-295, GN Docket No. 17-183, at 1-2 (filed Mar. 18, 2019); Comments of 5G Automotive Association, ET Docket No. 18-295, GN Docket No. 17-183, at 5 (filed Feb. 15, 2019); Comments of Qualcomm Incorporated, ET Docket No. 18-295, GN Docket No. 17-183, at 12, 14-15 (filed Feb. 15, 2019).

⁷⁵ See, e.g. *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Report & Order, 29 FCC Rcd 6567 ¶ 89 (2014).

⁷⁶ See 47 C.F.R. § 15.407(h)(2) (requiring DFS for unlicensed devices operating in the 5.25-5.35 GHz and 5.47-5.725 GHz frequencies).

allocation for V2X shrinks, so does the likelihood of effective and successful deployment of DSRC and 4G LTE C-V2X.

Accordingly, the Commission should thoroughly study the issue of interference and consider revising its band plan and service rules to ensure that V2X is adequately protected. The best way to protect critical V2X communications is to allocate the entire 75 MHz in the 5.9 GHz band for V2X. But if the Commission ends up moving forward with the *NPRM*'s proposal, it must ensure the spectrum allocated for V2X is free from harmful interference. One of the Commission's key functions is to manage the spectrum in the public interest, which entails adopting spectrum policies that protect services from harmful interference.⁷⁷ Indeed, as discussed in Section IV, the Communications Act places limits on Commission action that would fundamentally change or imperil existing licensee services. Whatever band plan is ultimately adopted, the FCC should conduct additional testing to identify the level of cross-channel interference to V2X and take steps to reduce such interference.

B. Reallocation Outside of the 5.9 GHz Band is Not Feasible for V2X.

In response to the Commission's questions regarding potential reallocation for V2X technologies,⁷⁸ it is well understood that it is not possible for V2X technologies to simply move to another portion of spectrum. Transitioning current 5.9 GHz licensees deploying V2X technologies to spectrum outside of the band would be extremely burdensome, if not impossible,

⁷⁷ Title III of the Communications Act of 1934, as amended, 47 U.S.C. §§ 301, et seq., "endow[s] the Commission with expansive powers," including "broad authority to manage spectrum . . . in the public interest." *Cellco P'ship v. FCC*, 700 F.3d 534, 541, 542 (D.C. Cir. 2012) (internal quotes and citations omitted). Determinations with respect to spectrum allocation policy have long been recognized to be precisely the sort that Congress intended to leave to the broad discretion of the Commission under § 303 of the Communications Act. *See Nat'l Ass'n of Regulatory Util. Comm'rs v. FCC*, 525 F.2d 630, 635-36 (D.C. Cir. 1976) (initial allocation of spectrum for land mobile radio service).

⁷⁸ *NPRM* at ¶ 34.

due to the unique characteristics of the spectrum. Specifically, the Commission initially selected the 5.9 GHz band for V2X because it is internationally harmonized, and thus allows American licensees to take advantage of economies of scale. Moreover, the unique propagation characteristics of the band allow for non-line-of-sight communications between vehicles and infrastructure. In addition to the ability of 5.9 GHz band frequencies to be propagated around obstacles, they also enable low-latency communications which are ideally suited for facilitating vehicle automation and safety applications. Reallocation to higher frequencies would not be viable as there the signal can be blocked by walls and obstacles, and reallocation to lower frequencies would not be viable due to existing allocations to other users with no real possibility for sharing for V2X. Therefore, it is unlikely that V2X could be successfully transitioned elsewhere given the rare characteristics of the band, international harmonization, and the hundreds of existing or planned deployments already utilizing the spectrum.

The FCC also asserts that C-V2X could utilize 5G spectrum outside the 5.9 GHz spectrum band in the 2.5 GHz, 3.5 GHz or 3.7 GHz bands.⁷⁹ This is not the case. Once 5G becomes available, the 5G spectrum will enable a wide variety of companies (including those in the transportation sector) to utilize 5G for commercial purposes. ITS applications, which require priority and low latency access to the airways, will need to compete for access rendering them unreliable. Due to V2X applications' safety-critical functions, it will not possible to safely deploy V2X technologies in bands where V2X would need to compete for access to the

⁷⁹ *Id.* at ¶ 30 (“If we adopt our proposal to provide 45-megahertz of spectrum for unlicensed operations in this band, such a large provision of spectrum for C-V2X would not be possible. Nor does it appear that such an authorization in the 5.9 GHz band makes much sense. The Commission is already on the path to make substantial mid-band spectrum available for 5G in the 2.5 GHz and 3.5 GHz bands, and is proposing to do so in the 3.7 GHz band, so allocating a larger spectrum designation in the 5.9 GHz band as a path to 5G appears unnecessary.”).

spectrum. In addition, spectrum for 5G outside of the 5.9 GHz band will likely be exclusively licensed and may therefore require American consumers to pay providers for access. In contrast, the 5.9 GHz band was specifically set aside for the public benefit. It is not reasonable to assume that there will be 5G spectrum outside the 5.9 GHz band available for V2X use.

In contrast, the 5.9 GHz band is not the only option for allocating additional spectrum for unlicensed usage, as the Commission has given Wi-Fi devices access to numerous spectrum bands and likely will soon be making even more spectrum available at 6 GHz. For example:

- In 2016, the Commission authorized unlicensed operations in the 64-71 GHz band, which “double[d] the amount of high-band unlicensed spectrum to 14 GHz of contiguous unlicensed spectrum [when paired with the 57-64 GHz band]” and represented “15 times as much as all unlicensed Wi-Fi spectrum in lower bands.”⁸⁰
- In 2019, the Commission adopted new rules to make a massive 21.2 GHz of spectrum available for use by unlicensed devices in the 116-123 GHz band, the 174.8-182 GHz band, the 185-190 GHz band, and the 244-246 GHz band.⁸¹
- The Commission has proposed rules that would expand unlicensed use in both the 5.925-6.425 GHz and 6.425-7.125 GHz bands, which together constitute the 6 GHz band.⁸² This proceeding would add another 1,200 MHz of prime mid-band spectrum for unlicensed use.
- In 2018, the Commission adopted rules for the CBRS spectrum band at 3550-3700 MHz, making 80 MHz of spectrum available for licensed-by-rule (“GAA”) use, plus giving GAA users the ability to operate in areas where licensees have not built out service.⁸³

⁸⁰ See *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014 ¶¶ 4, 125 (2016); Fact Sheet: Spectrum Frontiers Proposal to Identify, Open Up Vast Amount of New High-Band Spectrum for Next Generation (5G) Wireless Broadband (July 14, 2016), available at <https://docs.fcc.gov/public/attachments/DOC-339990A1.pdf>.

⁸¹ See *In re Spectrum Horizons; James Edwin Whedbee Petition for Rulemaking to Allow Unlicensed Operation in the 95-1,000 GHz Band*, First Report and Order, 34 FCC Rcd 1605, 1608-09, ¶¶ 7-11 (2019).

⁸² See *In re Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in the Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Proposed Rulemaking, 33 FCC Rcd 10496, 10497, ¶¶ 1-2 (2018).

⁸³ See *Promoting Investment in the 3550-3700 MHz Band*, Report and Order, 33 FCC Rcd 10598, 10619, 10636, ¶¶ 38, 68 (2018).

While GAA users are technically licensed to operate in the 80 MHz portion of the band, they must avoid causing harmful interference to both Incumbent Access and Priority Access users, both of whom have higher spectral priority.⁸⁴ Similar to unlicensed, GAA users also receive no interference protection.⁸⁵

NTIA calculated that “a full 14,689.5 megahertz (14.7 gigahertz) of unlicensed spectrum has been made available across low-band (26 megahertz), mid-band (663.5 megahertz) and high-band (14,000 megahertz) ranges” with “a further 1,200 megahertz [] proposed for mid/high-band unlicensed usage.”⁸⁶ Given these numbers, it is evident that the success, or even incremental progress, of gigabit Wi-Fi does not hinge on access to 45 MHz of spectrum allocated for auto safety. Rather, the 6 GHz band appears to hold great promise for unlicensed. In March, the Wireless Broadband Alliance (“WBA”) announced the results of the first phase of Wi-Fi 6E trials, stating that “the results show that use of the 6 GHz band could provide more capacity than all the other Wi-Fi bands put together.”⁸⁷ Indeed, WBA stated that Wi-Fi use of the 6 GHz band now “looks near certain.”⁸⁸ Opportunities for unlicensed operation at various bands across the radio frequency spectrum abound.

Wi-Fi likewise has other options for creating 160 MHz channels, which proponents claim will enable multi-gigabit, low latency connections.⁸⁹ Wi-Fi proponents tout that the proposed

⁸⁴ *Id.* at 10599-10600, ¶ 3.

⁸⁵ *Id.*

⁸⁶ *Annual Report on the Status of Spectrum Repurposing*, Department of Commerce at 6 (Aug. 2019)
https://www.ntia.doc.gov/files/ntia/publications/spectrum_repurposing_report_august_2019.pdf.

⁸⁷ Ian Scales, *Wi-Fi 6E trials in the 6GHz band: the results are in*, Telecom TV (Mar. 3, 2020), <https://www.telecomtv.com/content/news/wi-fi-6e-trials-in-the-6ghz-band-the-results-are-in-37905/>.

⁸⁸ *Id.*

⁸⁹ *See, e.g. Ex Parte Letter* from Charter, ET Docket Nos. 13-49, 18-295, at 1 (filed Nov. 12, 2019); *Ex Parte Letter* from Broadcom, ET Docket No. 13-49, at 1 (filed Dec. 5, 2019).

band plan’s allocation of 45 MHz for unlicensed would create a contiguous 160 MHz Wi-Fi channel when paired with the adjacent 5.8 GHz band.⁹⁰ But the benefits of a 160 MHz channel can be realized without relying on the spectrum in the 5.9 GHz band. For example, combining two non-adjacent 80 MHz channels could enable the same benefits as use of a single 160 MHz channel. The IEEE 802.11 standard supports combining two non-adjacent 80 MHz channels, and amendments to this standard will likely do the same.⁹¹ Through opportunities in other spectrum bands and leveraging of technologies, unlicensed has multiple viable options for Wi-Fi—and gigabit Wi-Fi—beyond the 5.9 GHz band. The Commission should accordingly retain the full 75 MHz of spectrum in the 5.9 GHz band for V2X applications.

IV. CERTAIN COMMISSION PROPOSALS WOULD VIOLATE THE COMMUNICATIONS ACT PROVISIONS ON LICENSE MODIFICATION AND REVOCATION.

The *NPRM*’s proposed band plan is not only contrary to the public benefit and wellbeing, it is also beyond the FCC’s authority. The Communications Act imposes significant limitations on Commission action that would change the rights of existing licensees. If the Commission adopted the proposed band plan, it would represent a fundamental change to the DSRC licenses, and therefore exceed the Commission’s authority to modify licenses under Section 316 of the

⁹⁰ *Id.*

⁹¹ See IEEE Standard for Information Technology, Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications, 21.1.1 (2016) (“The [very high throughput physical layer] provides support for 20 MHz, 40 MHz, 80 MHz, and 160 MHz contiguous channel widths and support for 80+80 MHz noncontiguous channel width.”); Advanced Wireless LAN Technologies: IEEE 802.11AC and Beyond at 48, 49, http://www.eng.auburn.edu/~szm0001/papers/MC2R_Oct14.pdf (“As an evolution to 802.11n, 802.11ac adds 80 MHz, 160 MHz and non-contiguous 160 MHz (80 + 80 MHz) channel bandwidths” and Table 1 shows 802.11ax “unlikely to change from 802.11ac” in terms of channel bandwidth).

Act.⁹² Further, a band plan that provides no spectrum for DSRC licensees would constitute an impermissible revocation of existing licenses and run afoul of Section 312 of the Act.⁹³

Section 316 authorizes the FCC to “modif[y]” a station license or construction permit consistent with the “public interest, convenience, and necessity.”⁹⁴ However, as the Supreme Court has explained, the term “modify” means “moderate” and “minor” changes.⁹⁵ The FCC’s “power to ‘modif[y]’ existing licenses does not enable it to fundamentally change those licenses.”⁹⁶ The Commission’s proposed band plan, which would substantially modify Part 90 and 95 DSRC licenses to reduce available operating bandwidth from 75 MHz to 10 MHz, would represent a fundamental change to the DSRC licenses.

The proposed band plan additionally constitutes a fundamental change as it would prevent DSRC licensees from providing safety critical communications using V2X technologies. The Commission has acknowledged that a fundamental change occurs when a licensee cannot provide substantially the same services under very similar terms.⁹⁷ Here, DSRC licensees would

⁹² 47 U.S.C. § 316(a)(1).

⁹³ *Id.* § 312.

⁹⁴ *Id.* § 316(a)(1).

⁹⁵ *MCI Telecomms. Corp. v. AT&T*, 512 U.S. 218, 228 (1994) (holding FCC action to modify tariff filing requirements unlawful).

⁹⁶ *Id.*

⁹⁷ *See Cmty. Television, Inc. v. FCC*, 216 F.3d 1133, 1141 (D.C. Cir. 2000) (citing *In re Advanced Television Systems and Their Impact Upon Existing Television Broadcast Service*, Memorandum Opinion and Order on Reconsideration of the Fifth Report and Order, 13 FCC Rcd 6860, 6873-74 (2000)) (The Commission reasoned it had authority under Section 316 to modify existing broadcaster licenses through the issuance of initial digital TV licenses even though it chose not to require 100 percent simulcasting because broadcasters would be providing “essentially the same services” to the public during the digital transition.); *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Draft Report and Order and Order of Proposed Modification, at ¶ 129 (rel. Feb. 7, 2020) (“effectively revoking a license or substantially disrupting a licensee’s ability to provide service may amount to a fundamental change,” but “if a licensee can continue

not be able to use their licenses to provide the same services under similar terms if the Commission adopts its proposed band plan. The standardized channel plan to enable V2X use cases will necessitate all seven channels across the entire 5.9 GHz band.⁹⁸ Reducing the bandwidth available for V2X to 10 MHz—a single channel—effectively would prevent licensees from providing many of these services. Moreover, as the U.S. DOT and NHTSA testing has demonstrated, the Commission’s proposed band plan will result in pervasive, harmful cross-channel interference.⁹⁹ As a result, even the single channel preserved for DSRC may be so compromised by harmful interference as to be useless. Such a change to the incumbent licenses would be “much too extensive to be considered a ‘modification[,]’”¹⁰⁰ and constitutes the very definition of a fundamental change.

In contrast, updating the rules for the 5.9 GHz band to permit C-V2X systems to operate would not constitute a “fundamental change.” A modification of this sort would be minor, as it would allow for provision of substantially the same service, V2X, merely using a different technology. Allowing C-V2X in the band would not fundamentally change the capabilities of existing 5.9 GHz Part 90 and 95 incumbents. These entities could continue to provide substantially the same services under very similar terms.¹⁰¹

to provide substantially the same service, a modification to that license is not a fundamental change.”).

⁹⁸ GA Band Plan Ex Parte, Attachment Responding to Staff Questions at 1.

⁹⁹ See Section III.A.

¹⁰⁰ *MCI Telecomms. Corp.*, 512 U.S. at 231.

¹⁰¹ See *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Draft Report and Order and Order of Proposed Modification, at ¶ 129 (rel. Feb. 7, 2020) (“if a licensee can continue to provide substantially the same service, a modification to that license is not a fundamental change.”).

In addition, if the Commission takes action in this proceeding to eliminate all spectrum for DSRC,¹⁰² such action would constitute an unlawful license revocation under Section 312 of the Communications Act. If no spectrum is set aside for DSRC, the licenses effectively will be revoked. Section 312 of the Act permits the FCC to revoke a license only upon the occurrence of specifically enumerated circumstances, such as making “false statements” to the Commission or “willful or repeated violation” of Commission rules.¹⁰³ None of these circumstances would apply here. As the D.C. Circuit acknowledges, Section 312 constitutes “an intentional sanction against the license holder” that “require[s] termination of operations or relinquishment of spectrum usage rights.”¹⁰⁴ Because the 5.9 GHz Part 90 and 95 incumbents have satisfied the conditions of their licenses and are not in violation of the FCC’s character and fitness policies, there is no basis to revoke their licenses, and eliminating the spectrum segment for DSRC would therefore be unlawful under the Communications Act.

V. THE FCC’S COST/BENEFIT ANALYSIS IS FLAWED IN SEVERAL RESPECTS.

A. The *NPRM* Does Not Properly Quantify the Safety and Other Benefits Lost Under the FCC’s Proposal.

The *NPRM* fails to recognize the immense economic and safety benefits of dedicating spectrum for a life-saving technology like V2X. In so doing, the Commission departs from the record as well as its historic view of the importance of saving lives. In its cost/benefit analysis, the Commission omits any discussion of the Value of a Statistical Life (“VSL”), a departure from the agency’s consistent, standard practice across multiple proceedings involving safety-of-

¹⁰² See *NPRM* ¶ 31.

¹⁰³ 47 U.S.C. § 312(a).

¹⁰⁴ *Mako Commc’ns, LLC v. FCC*, 835 F.3d 146, 152 (D.C. Cir. 2016).

life services. The Commission should revise its cost/benefit analysis to properly account for the true cost of taking spectrum *away* from V2X before considering moving forward with the proposed band plan.

Through all of its proceedings on V2X services, the Commission has amassed a significant record regarding lives lost due to motor vehicle crashes in the United States and the life-saving potential of V2X services.¹⁰⁵ The *NPRM*, however, lacks any discussion of the value of statistical lives saved through V2X, a striking omission given that this metric has been regularly employed by the FCC in evaluating costs and benefits of proposed action. For example:

- In conducting a cost-benefit analysis of designating a three-digit dialing code for a national suicide prevention hotline, the Commission relied on the U.S. DOT’s guidance¹⁰⁶ identifying \$9.6 million as the value of a statistical life. The FCC stated that if mortality were reduced “by a fraction of one percent, it would be well worth its cost.”¹⁰⁷
- In its latest order on wireless 911 location accuracy for emergency calling, the Commission’s cost-benefit analysis affirmed that adding more detailed location information had the potential of “saving 10,120 lives annually,” leading to an estimated benefit of \$97 billion.¹⁰⁸

¹⁰⁵ See, e.g. Notice of *Ex Parte* Presentation of Association of Global Automakers, ET Docket Nos. 19-138 and 13-49, GN Docket No. 18-357 (filed Nov. 27 2019) (describing record materials reflecting the extent of the auto safety crisis, the life-saving potential of V2X services, and the importance of the basic safety message).

¹⁰⁶ Memorandum from Molly J. Moran, Acting General Counsel, and Carlos Monje, Assistant Secretary for Transportation Policy, Office of the Secretary of Transportation, Department of Transportation, Guidance on Treatment of the Economic Value of a Statistical Life (VSL) in U.S. Department of Transportation Analyses – 2016 Adjustment (August 8, 2016), <https://www.transportation.gov/sites/dot.gov/files/docs/2016%20Revised%20Value%20of%20a%20Statistical%20Life%20Guidance.pdf>.

¹⁰⁷ *Implementation of the National Suicide Hotline Improvement Act*, Notice of Proposed Rulemaking, WC Docket No. 18-336, FCC 19-128 at ¶ 49, n. 163 (Dec. 16, 2019).

¹⁰⁸ See *Wireless E911 Location Accuracy Requirements*, Fifth Report & Order and Fifth Further Notice of Proposed Rulemaking, PS Docket No. 07-114, FCC 19-124 ¶ 57 (Nov. 25, 2019).

- In its order enabling the delivery of Blue Alerts over the Emergency Alert System and Wireless Emergency Alerts, the Commission stressed that the value of saving even one human life, valued at \$9.6 million, greatly outweighed multi-million dollar implementation costs.¹⁰⁹
- In its Further Notice of Proposed Rulemaking on broadband network outage reporting, the Commission relied on the U.S. DOT's value of a statistical life to find that the economic value of improving network reliability and saving lives exceeded the costs of the proposed changes.¹¹⁰

Other federal agencies including the Environmental Protection Agency, the United States Department of Agriculture, the Food and Drug Administration, the Mine Safety and Health Administration, and the Occupational Health and Safety Administration also rely on estimates of the value of lives when assessing new policies.¹¹¹ The Commission should incorporate the value of statistical lives saved in its analysis of the costs and benefits of the *NPRM*'s proposal. The U.S. DOT values a statistical life at \$9.6 million and the National Safety Council estimates over 40,000 vehicle deaths occur each year.¹¹² Moreover, NHTSA estimates that at full deployment V2X services could avoid 89% of light vehicle to light vehicle crashes.¹¹³ If avoiding that

¹⁰⁹ See *Amendment of Part 11 of the Commission's Rules Regarding the Emergency Alert System*, Report and Order, 32 FCC Rcd 10812, 10825, ¶ 26 (2017).

¹¹⁰ See *Amendments to Part 4 of the Commission's Rules Concerning Disruptions to Communications*, Report and Order, Further Notice of Proposed Rulemaking, and Order on Reconsideration, 31 FCC Rcd 5817, 5881, ¶ 159, n. 402 (2016).

¹¹¹ See, e.g., *Mortality Risk Valuation*, Environmental Protection Agency (Feb. 8, 2018), <https://www.epa.gov/environmental-economics/mortality-risk-valuation#whatisvsl>; *Economic Research Service, Background and History*, U.S. Department of Agriculture (Aug. 20, 2019) <https://www.ers.usda.gov/data-products/cost-estimates-of-foodborne-illnesses/background-history/>; ; Required Warnings for Cigarette Packages and Advertisements, 75 Fed. Reg. 69524, 69545 (Nov. 12, 2010); Lowering Miners' Exposure to Respirable Coal Mine Dust, Including Continuous Personal Dust Monitors, 75 Fed. Reg. 64412, 64474 (Oct. 19, 2010); Cranes and Derricks in Construction; Final Rule, 75 Fed. Reg. 47906, 48094-95 (Aug. 9, 2010).

¹¹² *National Safety Council Webpage*.

¹¹³ See *supra* p. 5, n.13.

number of crashes eliminated even half of auto fatalities, V2X deployment could yield a recurring benefit of over \$192 billion per year.

In other proceedings the Commission has also measured the benefits of reductions in human suffering and reduced property losses in its comparison of costs and benefits.¹¹⁴ Reducing motor vehicle crashes has a broader impact than merely reducing fatalities—the CDC estimates that for every one person killed in a motor vehicle crash, eight people were hospitalized, and ninety nine people were treated and released from emergency departments.¹¹⁵ Despite these striking facts, the *NPRM* does not mention the value of reductions in human suffering, healthcare costs, or avoided property damage when discussing the band plan’s costs and benefits. The Commission should revise its analysis to incorporate these factors.

The *NPRM* also discounts the value of supporting delivery of safety-related communications. The Commission has previously given this benefit high value and should continue to do so in this proceeding. For example, in the aftermath of the 2017 hurricane season which ravaged Puerto Rico and the U.S. Virgin Islands, the Commission established strenuous hardening requirements on fixed and mobile providers because “even if the costs are substantial, the benefits of the requirements we adopt in terms of potential saved lives and avoided economic devastation are even greater.”¹¹⁶ It is uncontroverted that saving lives demands a high priority when evaluating the costs and benefits of a proposal as consequential as this one.

¹¹⁴ See, e.g., *Wireless E911 Location Accuracy Requirements*, Fifth Report & Order and Fifth Further Notice of Proposed Rulemaking, PS Docket No. 07-114, FCC 19-124 ¶ 60 (Nov. 25, 2019).

¹¹⁵ *Motor Vehicle Safety, Infographic*, Centers for Disease Control, <https://www.cdc.gov/motorvehiclesafety/> (last visited Feb. 11, 2020).

¹¹⁶ *The Uniendo a Puerto Rico Fund and the Connect USVI Fund; Connect America Fund; ETC Annual Reports and Certifications*, Report and Order and Order on Reconsideration, 34 FCC Rcd 9109, 9175-76, ¶ 137 (2019).

Further, the *NPRM* points to a study published by the RAND Corporation that estimates billions in contributions to the Gross Domestic Product as a result of authorizing unlicensed operations in the 5.9 GHz band.¹¹⁷ But, this study does not paint the whole picture. The RAND Study does not account for the fact that more spectrum for unlicensed means less for V2X and the technology’s well-documented safety and other benefits.¹¹⁸ The Commission itself acknowledges that the RAND Study does not estimate the *loss* of value that would result from a reduction in V2X spectrum.¹¹⁹ The Commission should adjust for this omission in considering the costs and benefits of the proposal.

The Commission should revise its analysis to properly account for the benefits of reserving ample spectrum for V2X and the costs of turning this spectrum over to unlicensed use before finalizing its band plan.

B. The Commission Should Look Critically at the Claimed Benefits of Reallocating Spectrum for Unlicensed Use.

In analyzing the benefits of allocating additional spectrum for unlicensed use, the Commission should not rely on faulty and unverified claims. While unlicensed usage and Wi-Fi serve important functions in the wireless ecosystem, V2X stands to provide significant benefits as well.

The RAND Study claims that the benefits of Wi-Fi will have particularly large implications for underserved and rural populations.¹²⁰ What the RAND Study does not discuss is

¹¹⁷ *NPRM* ¶ 65; Letter from Diana Gehlhaus Carew, Doctoral Fellow, RAND Corporation, to Marlene H. Dortch, Secretary, Federal Communications Commission, ET Docket No. 13-49 (filed Dec. 13, 2018) (“RAND Study”).

¹¹⁸ See discussion of potential for V2X with respect to roadway safety and reduction of accidents and traffic deaths discussed in Section II.A, *supra*.

¹¹⁹ *NPRM* ¶ 165, n.106.

¹²⁰ RAND Study, at 1.

that V2X applications and use cases will benefit these populations as well. V2V crash avoidance technology is a peer-to-peer technology that does not require a network to function. V2V will dramatically increase roadway safety even in rural areas not served by cellular networks. Further, deployment of V2X will facilitate the transition to a more automated fleet by providing enhanced awareness for both automated and non-automated vehicles, increasing safety, mobility, and economic opportunity. Those living in underserved and rural communities will be more connected to transportation options, enjoy the benefits of fleet-operated ride sharing and delivery services, and experience improved transit and paratransit services.¹²¹ All Americans stand to benefit from the seamless integration of mobility platforms that will occur due to V2X technologies.

Another major flaw in the RAND Study is that it focuses on the economic benefits of transitioning the *entire* 75 MHz of the 5.9 GHz band, when the *NPRM* only proposes to repurpose 45 MHz for unlicensed use.¹²² This flaw is compounded by the fact that the RAND Study does not account for other potential unlicensed allocations, such as the proposed 1.2 GHz allocation in the 5.925-7.125 GHz band.¹²³ The RAND Study's calculation of economic benefits should be viewed critically in light of these omissions.

Finally, although RAND estimates that benefits in economic welfare from full reallocation for unlicensed use could total \$189.9 billion,¹²⁴ this pales in comparison to the estimated benefits in reserving the band for V2X. Specifically, the U.S. DOT estimates that

¹²¹ See *ITS Testimony*, at 4-5.

¹²² *NPRM* ¶ 11.

¹²³ See *Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in the Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Proposed Rulemaking, FCC 18-147 (2018).

¹²⁴ RAND Study, at 42.

reserving the band for V2X would result in \$940 billion in cost savings annually.¹²⁵ Relatedly, reliance on the RAND Study would discount the intrinsic value in lives saved and injuries avoided on America’s roadways—something which local and state authorities and other safety stakeholders have repeatedly prioritized.¹²⁶ The Commission should look critically at the RAND Study and other resources that overstate the benefits for unlicensed while discounting the value of critical safety services provided by V2X.

VI. THE COMMISSION SHOULD CONTINUE TO EVALUATE THE FEASIBILITY OF SHARING THE 5.9 GHZ BAND WITH UNLICENSED DEVICES.

The *NPRM* marks a significant and unexplained departure from the 5.9 GHz band proceedings up until now. Previously, the Commission’s focus was on potential co-channel sharing solutions between V2X licensees and Unlicensed National Information Infrastructure (“U-NII”) devices, through methods such as “detect-and-vacate.”¹²⁷ The FCC, in partnership with the U.S. DOT, adopted a three-phase test plan, completed Phase I, and released a report finding that co-channel sharing on an “detect-and-vacate” basis was, in fact, feasible.¹²⁸ The

¹²⁵ These include savings resulting from traffic congestion costs and loss of life and injuries due to crashes. Letter from Elaine L. Chao, Secretary, Department of Transportation, to Ajit Pai, Chairman, Federal Communications Commission, at 1 (Nov. 20, 2019).

¹²⁶ Letter from Coalition for Safety Sooner, to Elaine Chao, Secretary, U.S. Department of Transportation et al., at 1-2 (Jan. 23, 2018); Letter from American Association of State Highway and Transportation Officials, to Ajit Pai, Chairman, Federal Communications Commission, at 1 (Aug. 1, 2019).

¹²⁷ See, e.g., *Revision of Part 15 of the Commission’s Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, ET Docket No. 13-49, Notice of Proposed Rulemaking, 28 FCC Rcd 1769, 1799, ¶ 101 (2013) (“We seek comment on what types of sharing technology or techniques could be used to protect non-radar systems, such as the DSRCs which includes both road side units (RSU-fixed) and on board units (OBUmobile) operating under a primary allocation.”); *Refresh PN*, 31 FCC Rcd at 6130-31, 6138-39.

¹²⁸ *The Commission Seeks to Update and Refresh the Record in the “Unlicensed National Information Infrastructure (U-NII) Devices in The 5 GHz Band” Proceeding*, Public Notice, 31 FCC Rcd 6130 (2016); *Phase I Testing PN*, 33 FCC Rcd 10766, at Attachment A, Report: TR-1006, Phase I Testing of Prototype U-NII-4 Devices.

U.S. DOT commenced Phase II, as planned.¹²⁹ Now, however, without waiting for test results to evaluate co-channel sharing options, the Commission has abruptly shifted course—absent explanation or data supporting the change—to propose reserving the majority of the band exclusively for Wi-Fi. Such an approach is the epitome of arbitrary and capricious decision making.¹³⁰ Rather than prematurely imposing rigid divisions of the spectrum and foreclose the auto industry’s use of the entire 5.9 GHz band, the Commission should continue its ongoing testing in conjunction with the U.S. DOT to determine whether and how the band can be shared with unlicensed devices through its Phase II and III testing plans. Although Phase I testing showed promise for “detect-and-vacate” methods, further testing is needed in the field to evaluate co-channel interference on a larger scale to ensure adequate performance and packet prioritization.¹³¹ Real world testing on these and other innovative spectrum sharing concepts should continue, though the Commission should not permit such testing to delay use of the 5.9 GHz band by V2X.

¹²⁹ See Remarks by Heidi R. King, National Highway Traffic Safety Administration Deputy Administrator, “Traffic Safety and the 5.9 GHz Spectrum,” (June 3, 2019) (“Phase 2 is happening now. The U.S. DOT team has developed a draft test plan for Phase 2 effort that has been shared with the FCC and NTIA.”); *5.9 GHz Transportation Safety Band Testing*, U.S. Department of Transportation, at 10-11, <https://www.transportation.gov/sites/dot.gov/files/docs/research-and-technology/363111/arnold-slides-v3-19nov2019-update.pdf> (last visited Mar. 9, 2020).

¹³⁰ See, e.g. *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Ins. Co.*, 103 S. Ct. 2856, 2867 (1983) (“Normally, an agency rule would be arbitrary and capricious if the agency has. . . entirely failed to consider an important aspect of the problem [or] offered an explanation for its decision that runs counter to the evidence before the agency[.]”); *Gen. Chem. Corp. v. United States*, 817 F.2d 844, 846 (D.C. Cir. 1987) (finding agency action arbitrary and capricious because it was “internally inconsistent and inadequately explained”).

¹³¹ Comments of the Association of Global Automakers, Inc., ET 13-49, at 8 (filed Nov. 28, 2018).

Additionally, this testing should be expanded as new V2X technologies emerge. Other V2X technologies that must be evaluated include IEEE Next Generation V2X and 5G V2X. Both Next Generation V2X and 5G V2X present the opportunity to usher in further innovation for enhanced safety and automated vehicle capabilities. As the Commission considers the potential for sharing the 5.9 GHz band it should continue to employ a data driven, fact-based approach to optimizing current and future utilization of the 5.9 GHz band. The U.S. DOT has emphasized the importance of such an approach in moving towards automated vehicle integration.¹³²

To the extent the Commission discovers that certain tested sharing mechanisms are not feasible, the appropriate solution is not to reallocate spectrum or abandon the testing, but to revise the testing program and continue to explore new possibilities for spectrum sharing. As radiofrequency technology has developed, the Commission has implemented numerous innovative spectrum-sharing models that allow spectrum to be utilized effectively by different types of services. For example, the Commission developed a three-tier sharing model for the 3.5 GHz, or “Innovation Band” given its importance for the development of small cell wireless technology.¹³³ While federal incumbents have complete protection from interference under the

¹³² See *Data for Automated Vehicle Integration (DAVI)*, U.S. Department of Transportation (Dec. 4, 2019) (Among the DAVI guiding principles, DOT identifies promoting “data-driven safety, cybersecurity, and privacy protection practices.”).

¹³³ Other spectrum sharing models that the Commission has adopted include the Advanced Wireless Services (“AWS-3”) band plan and the millimeter wave spectrum sharing proceedings. *In re Use of the Bands Above 24 GHz for Commercial Radio Services*, GN Docket No. 14-177, WT Docket No. 10-112, Third Report and Order, Memorandum Opinion and Order, & Further Notice of Proposed Rulemaking, 33 FCC Rcd 5576 (2018); *In re Amendment of the Commission’s Rules with Regard to Commercial Operations in the 1695- 1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands*, GN Docket No. 13-185, 29 FCC Rcd 4610 (2014).

plan, Priority Access Licensees receive interference protection from GAA users.¹³⁴ The Commission should extend its creative mindset to evaluating the potential for sharing in the 5.9 GHz band. Given the importance of V2X safety technology and the unique characteristics of the band that allow for non-line-of-sight communications, it is imperative that the Commission develop a sharing mechanism that works for both licensed and unlicensed usage without creating harmful interference.

VII. CONCLUSION

The Auto Innovators respectfully request that the Commission revise its proposed band plan to preserve the entire 75 MHz of the 5.9 GHz band for V2X. The Commission should take action in this proceeding to help forge a path forward that delivers on the life-saving promise of V2X for the American people.

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¹³⁴ *Amendment to the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, Report and Order and Second Further Notice of Proposed Rulemaking, 30 FCC Rcd 3959, 3975, ¶ 45 (2015).