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INTRODUCTION

General Motors LLC (“General Motors” or “GM”) remains committed to be a part of efforts to develop and deploy advanced Vehicle-to-Everything (“V2X”) communications technologies that will enhance the safety and efficiency of the nation’s transportation system, including significantly reducing automotive crashes and fatalities. But for these benefits to have a chance of being realized, the transportation industry and roadway operators need substantially more spectrum available than proposed by the Federal Communications Commission (“FCC” or “Commission”). Therefore, the Commission should abandon its proposal, which would decimate the current 75-megahertz allocation reserved for Intelligent Transportation Systems (“ITS”) usage, and preserve the entire 75 megahertz for V2X and transportation safety.¹

Slashing 60 percent of the 75 megahertz 5.9 GHz band and therefore limiting ITS technologies to only 30 megahertz will strand already-deployed V2X units and users, foreclose advanced safety features of the future, and compromise the technology’s lifesaving potential. In effect, this proposal, which will only marginally benefit commercial, non-safety unlicensed uses, will likely end V2X.

Without a viable V2X plan for the U.S., this proposal jeopardizes American global leadership in the automotive space and will limit our progress in a global race towards transportation innovation in automation, connectivity, and safety. By changing existing rules, this proposal halts in its tracks the groundbreaking work already completed and ongoing to develop and deploy V2X technology at scale, and conflicts with longstanding collaboration on safety between the U.S. Department of Transportation (“DOT”), the automotive and

¹ See *Use of the 5.850-5.925 GHz Band*, Notice of Proposed Rulemaking, ET Docket No. 19-138, 34 FCC Rcd 12603 (2019) (“NPRM”).

transportation sector, the Commission, and the National Telecommunications and Information Administration (“NTIA”).

In addition, the Commission’s proposed band plan poses several new, potentially insurmountable obstacles for V2X. First, the NPRM arbitrarily proposes to leave a mere 30 megahertz of the current 75 megahertz to for nationwide safety-enhancing V2X communications and then further segments that into two even smaller bands: (1) 10 megahertz potentially to DSRC and (2) 20 megahertz to C-V2X. The plan would render the band, in effect, unusable for either DSRC or C-V2X communication protocols. As a result, several potential lifesaving V2X applications will be lost. This allocation is plainly inadequate.

Second, the plan dismisses legitimate concerns of harmful interference and leaves safety-enhancing V2X communications exposed and unprotected from unlicensed use. For safety applications to work, V2X communications must operate in a reliable and secure environment to support constant interoperable communications between vehicles and infrastructure. This proposal does nothing to protect these communications, and fails to even contemplate the possible role of a “guard band.” Even if the 30 megahertz of spectrum was sufficient for V2X technologies, and it is not, the lack of basic protections from harmful interference means that this 30 megahertz would be unusable for safety applications.

Third, the NPRM’s proposed reallocation of V2X to a different band outside the 5.9 GHz range is also infeasible. The 5.9 GHz range was specifically allocated to dedicate a section of spectrum to ITS and safety use in order to ensure that the intended transportation functions can work without interference from other users. Relocating some, or all, of the ITS band to other spectrums only takes the same interference risks and moves them into bands not suitable for V2X to effectively operate.

Finally, the NPRM would have the FCC define the permissible automotive technologies that can be used in the 5.9 GHz band rather than establishing it for dedicated transportation use. Defining specific technologies does not future-proof the automotive safety band and jeopardizes roadway safety advancements.

Seemingly driven primarily by the cable industry, the NPRM is premised on a premature and sweeping conclusion: That a subset of the current allocation (30 megahertz) is adequate for all transportation's needs and that an incremental expansion of unlicensed usage is in the best interest the country. As a result, the Commission seeks to permanently shift 45 megahertz to unlicensed use and leave the remaining 30 megahertz of spectrum for safety-essential ITS—all without addressing the reality that this action would wipe out V2X just as the technology is poised to take off.

The drastic changes proposed in the NPRM undermine the partnership and shared commitment between the Commission, DOT, NTIA, and industry to improve roadway safety and disregard state and local transportation operators who have already committed to deploying ITS within the current 5.9 GHz band rules. We are at the cusp of a mobility and vehicle safety revolution in the U.S., and the Commission has a pivotal opportunity to demonstrate global leadership when it comes to supporting the latest innovations to enhance the safety and efficiencies of the nation's transportation system.

To ensure that the American public enjoys the life-enhancing and safety benefits from this 75 megahertz spectrum resource, GM respectfully makes a narrow request: Allow the transportation community (vehicle manufacturers and infrastructure owner/operators) a brief period to define an industry-wide V2X deployment plan in the ITS-dedicated 75 megahertz of the 5.9 GHz band. Specifically, the Commission should hold off reallocating any of the 75-

megahertz spectrum currently dedicated to ITS safety and allow the transportation community to further define an at-scale and coordinated deployment plan that contemplates the necessary items for deployment to be realized. Real progress is ongoing within the automotive industry to realize usage for the 5.9 GHz spectrum, and we believe a timely plan is possible that would result in significant commitments to deploy this lifesaving technology. To this end, GM was involved in developing the Alliance for Automotive Innovation (“Auto Innovators”) comments to this NPRM, which GM supports and are consistent with these GM comments. Much of the industry participated in the development of the standards and tests that make the promise of V2X possible, and we are aligned in our concern that reallocating the safety spectrum for unlicensed use as proposed will likely make any future V2X deployment at scale in the U.S impossible.²

I. BACKGROUND

At General Motors, we have a vision of a world with zero crashes, zero emissions and zero congestion. Innovation and technology are GM’s North Star. For example, GM brought the world the first electric starters, first production V-8 engines, first automatic transmission, and the first airbags. Today, GM and the industry are rapidly deploying proven crash-avoidance features like front-collision warning and automatic emergency braking. GM has a long and distinguished record of identifying, investing in, and incorporating safety solutions into its vehicles and related products.

For years now, GM has believed in the potential of V2X to enable advanced safety and traffic features with capabilities beyond those that rely on onboard sensors alone. For example,

² See also Letter from Elaine L. Chao, Secretary, U.S. Dep’t. of Trans., to Ajit Pai, Chairman, U.S. Fed. Commc’ns. Cmm’n., (Nov. 20, 2019) (“[T]he Department would support a proposed revision to the existing band plan from specifying [DSRC] to a technology-neutral approach that preserves the entire band for its existing purposes, but allows the market, and not the Federal government, to determine the specific communication technology that will best achieve these purposes.”) (“November 20, 2019 DOT Letter”).

when a vehicle approaches an intersection, V2X can send and receive messages allowing the vehicle to warn the driver of potential hazards that might otherwise not be visible. We have invested significant capital into researching, developing and deploying V2X technology, and in 2014, we announced that we would be first to market in the U.S., and we deployed V2V technology as standard equipment on Cadillac CTS vehicles for model years 2017-2019. This V2V capability can process thousands of messages per second, from vehicles up to nearly 1,000 feet away. It can also detect common hazardous scenarios that standard sensors may not (*e.g.*, hard braking ahead in traffic, slippery road conditions, or disabled vehicles ahead) and provide alerts to the driver.

GM proudly invested in and installed these safety innovations, and, in 2018, announced additional plans to eventually expand the deployment to all Cadillac models.³ Such technology deployments take time and investment. In the case of V2X, it is also dependent upon a known and certain technological eco-system in which interoperability with other users is defined and protection from interference is assured.

Regrettably, the significant uncertainty of the rules created by ongoing FCC statements in recent years about changing the spectrum rules one way, or another, and now the proposals within this NPRM, have threatened any further deployments.⁴ The transportation industry's hands are currently tied with respect to deploying V2X at scale unless and until automakers have

³ See General Motors Press Release, Cadillac to Expand Super Cruise Across Entire Lineup, (June 6, 2018); Letter from Paul Hemmersbaugh, Chief Counsel and Policy Director, Transportation as a Service, GM, to Ms. Marlene H. Dortch, Secretary, U.S. Fed. Commc'ns. Cmm'n., ET Docket No. 13-49 (July 13, 2018) ("GM's V2X technology relies on DSRC and the entire 5.9 GHz band to communicate between cars and roadway infrastructure and to bring next-generation automotive safety to drivers everywhere.").

⁴ See Letter from Debbie Dingell, Member of Congress, to Ajit Pai, Chairman, U.S. Fed. Commc'ns. Cmm'n., (Dec. 11, 2019) ("Uncertainty about the future of this band has, for years, undercut the auto sector's ability to make investment decisions.").

access to sufficient spectrum with stable rules that support future connected-vehicle safety and ITS needs. As DOT has recognized, thousands of infrastructure communications devices have already been deployed, with additional deployments planned by 2020 in 26 states and 45 cities.⁵

While GM is disappointed in the NPRM's direction to drastically reduce spectrum currently reserved for transportation safety and ITS, and the increased risk of harmful interference it brings, we nonetheless appreciate the opportunity to participate in this proceeding and we look forward to actively engaging with and serving as a resource for the Commission and other interested parties. But the simple fact is that the proposal set forth in the NPRM is premature. If the Commission can permit the industry some time, GM is committed to continuing to work with our industry partners to define a plan in a timely manner that would result in deployments that will achieve the intended safety benefits the Commission set forth when it allocated the 5.9 GHz spectrum.

II. THE FCC'S PROPOSED BAND PLAN WOULD EFFECTIVELY END V2X

The NPRM arbitrarily proposes to remove 45 megahertz of the current 75 megahertz from the 5.9 GHz spectrum and leave the leftovers—30 megahertz—for nationwide safety-essential ITS. This limited spectrum allocation is plainly inadequate and would effectively end V2X. Research has shown that at least 47 megahertz 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 that a full 75 megahertz is needed to unlock the full lifesaving potential of V2X.⁶

⁵ See U.S. Dep't. of Transp., *Automated Vehicles 3.0: Preparing for the Future of Transportation 14-15* (Oct. 2018).

⁶ *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

A. The 10 Megahertz for DSRC Will Be Unusable and C-V2X Will Not Be Possible

Operation of DSRC in the proposed 10 megahertz (5.895-5.905 GHz) is unusable due to the high likelihood of interference from unlicensed in the neighboring lower band and interference from adjacent higher band C-V2X operations. Additionally, the usages planned for the current 7 channel allocation would all be forced to operate in a single 10 megahertz channel.

To realize the tremendous potential benefits of V2X in the United States, it is critical that the Commission preserve the entire 5.9 GHz band for transportation safety. As noted in our previous filing on GN Docket No. 18-357, GM supports the 5GAA petition for a temporary waiver to allow the deployment of C-V2X to demonstrate whether C-V2X can work effectively in field conditions and at scale.⁷ We believe this is an important action to continue moving transportation safety innovation forward. But with only 20 megahertz, this technology will not move forward at scale and will not advance with innovation, which is another compelling reason why the safety spectrum currently dedicated to automotive safety should not be reallocated to unlicensed use.

However, while allocating 20 megahertz for C-V2X technology (*i.e.*, Release 14) could permit some applications to proceed, the real promise of C-V2X is based on the more powerful 5G-based C-V2X technology (*i.e.*, Release 16/17) which requires a separate 40 megahertz (meaning that 60 megahertz total is needed for C-V2X to be fully realized).⁸ 5G C-V2X

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 megahertz are necessary for safety-based applications for Vehicle-to-Person, Vehicle-to-Vehicle, and Vehicle-to-Infrastructure.”).

⁷ See Letter to Marlene H. Dortch, U.S. Fed. Comm'n's Cmm'n, from Angela E. Giancarlo, counsel for General Motors, GN Docket Nos. 13-49, 18-357 (Jul. 15, 2019).

⁸ See 5GAA, *Petition for Waiver to Allow Deployment of Intelligent Transportation System Cellular Vehicle to Everything (C-V2X) Technology*, GN Docket No. 18-357, at 5 (Nov. 21, 2018).

promises new capabilities due to its combination of ultra-low latency, high data rates and advanced reliability,⁹ but none of this will be fully developed or realized without the needed spectrum. Accordingly, we urge the Commission to maintain the full 75-megahertz allocation for automotive safety purposes and to future-proof the spectrum by ensuring that adequate spectrum is available for transportation safety advancements.

B. Important V2X Safety Applications Will Be Lost

By reallocating 45 megahertz of spectrum to unlicensed use, or four of the seven 10 megahertz channels currently permitted within the 5.9 GHz band, the FCC is effectively taking important vehicle safety applications off U.S. streets.¹⁰ For example, V2X applications designed to protect vulnerable road users in urban areas—*e.g.*, pedestrians and bicyclists—will be limited or lost with only 20 or 30 megahertz as those features require at least 47 megahertz.¹¹

Moreover, by dramatically reducing the spectrum available and not protecting the remaining spectrum from harmful interference, key V2X safety benefits will be limited:

⁹ *See id.* at 21-22 (“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.”).

¹⁰ 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 (for red light warnings); the Map Data Message (for intersection movements and curve speed warnings); RTCM corrections (for V2X positioning accuracy); the Personal Safety Message (for avoiding pedestrians, cyclists, and road workers); the Signal Request Message (for use by emergency vehicles to broadcast priority messages); the Signal Status Message (emergency vehicle communication with other connected road users); the Traveler Information Message (transmits road condition alerts to operators); the NMEA corrections message (to improves V2X positioning accuracy); the Emergency Vehicle Alert Message; the Probe Data Management Message; the Probe Vehicle Data Message (vehicle functionality alerts); the Road Side Alert Message; the Common Safety Request Message; and the Intersection Collision Avoidance Message.

¹¹ *See 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 megahertz are necessary for safety-based applications for Vehicle-to-Person, Vehicle-to-Vehicle, and Vehicle-to-Infrastructure.”)

- Vehicle-to-Vehicle (V2V) safety: 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, and collective perception enabled by sensor functionality), cooperative adaptive cruise control, and the ability of vehicles to obtain information about objects around them located beyond the view of onboard sensors.
- Vehicle-to-Infrastructure (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.
- Additional safety applications: Vehicle platooning, advanced driving with extended sensors to enable path planning, real-time local updates, coordinated driving, collective perception, remote driving.

III. THE FCC’S PROPOSAL IGNORES THE RISK OF HARMFUL INTERFERENCE AND FAILS TO ADEQUATELY PROTECT V2X COMMUNICATIONS

V2X has the potential to save thousands of lives.¹² But the success of V2X depends on the Commission maintaining adequate spectrum available for automotive safety, and the adoption of a band plan that avoids harmful interference. As a baseline, V2X requires a Basic Safety Message to be transmitted 10 times every second. These communications must be constant and consistent between and among vehicles and infrastructure for crashes to be reduced

¹² See *Vehicle-to-Vehicle Communications: Readiness of V2V Technology for Application*, NHTSA, DOT HS 812014, § XII (Aug. 2014).

and lives saved. Interference from adjacent bands impedes these messages and jeopardizes passenger safety.

Testing by U.S. DOT and the National Highway Traffic Safety Administration (“NHTSA”) has already demonstrated that unlicensed use in the proposed 45 megahertz will harmfully interfere with V2X communications. The DOT also concluded that “transportation safety will be impacted” under the FCC’s proposal.¹³ Despite this clear evidence of interference, the proposals in the NPRM would not protect V2X communications in the limited bandwidth V2X would be confined.

Similarly, NHTSA’s testing showed that V2X would likely suffer from cross-channel interference, and if anything, NHTSA’s testing understates the interference to V2X under the new FCC proposal.¹⁴ Additionally, the FCC’s contemporaneous proposal to expand unlicensed use of the adjoining 6 GHz band could also further expose V2X to interference from the spectrum above.¹⁵

A. The Proceeding Must Consider Action to Mitigate Harmful Interference

Resolving the issue of interference is central to all FCC proceedings that propose spectrum allocations. However, the NPRM does not even reference the term “guard band” as one possible approach to address cross-channel interference. The proposal contains scant scientific, economic, or other data upon which to conclude that the licensed 5.9 GHz band ought to be unevenly divided in favor of unlicensed uses. Nor does the NPRM seek comment on

¹³ *Preliminary Testing: Out-of-Channel Interference (Out-of-Band-Emissions)*, U.S. Dep’t of Trans., at 1 (Dec. 6, 2019).

¹⁴ *DSRC and Wi-Fi Baseline Cross-channel Interference Test and Measurement*, Nat’l Highway Traffic Safety Admin. (Jan. 2020). Among other things, NHTSA’s testing did not include moving vehicles, which might experience worse interference as they passed Wi-Fi transmitters.

¹⁵ *Unlicensed Use of the 6 GHz Band*, ET Docket No. 18-295; *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, GN Docket No. 17-183, Notice of Proposed Rulemaking, 33 FCC Rcd. 10496 (2018).

additional means to mitigate harmful interference within the 5.9 GHz devices intended for use near the 5.9 GHz band must be required to meet out-of-band-emission (“OOBE”) limits that would need to be much more stringent than the currently allowed -4.8 dBm/MHz limit.¹⁶ At minimum, the OOBE limits on either side of the 5.9 GHz band access must be configured to match the levels previously promulgated in 2014 for devices operating in the neighboring 5.725–5.850 GHz band: -17 dBm/MHz for the first 10 megahertz from the band edge and -27 dBm/MHz thereafter so long as the power emissions are limited.¹⁷

Underscoring the need for more stringent protections from harmful interference, testing by the CAMP-VSC6 Consortium, which includes Ford, GM, Honda, Hyundai, Nissan, and Volkswagen, concluded that the proposed OOBE limits are insufficient. Using the current U-NII limits (set forth in the 2016 U-NII Devices Order) the CAMP-VSC6 Consortium conducted co-channel and cross-channel interference testing, concluding the following:

Cross-channel test results showed the potential for cross-channel interference, having an impact on DSRC performance, up to a range of 500 meters or more, but typically between 200 and 300 meters. However, the results also generally showed that the closer the spectral occupancy was to the 802.11ac spectral mask requirements, the greater the cross-channel interference impact to DSRC performance.¹⁸

GM supports robust analysis and discussion around emissions and power limitations, and remains open to the possibility of sharing; however, in 2018, in connection with an effort to "update and refresh the record," the Commission acknowledged that these issues were never

¹⁶ See *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, Memorandum Opinion and Order, 31 FCC Rcd 2317 (2016) (“2016 U-NII Devices Order”).

¹⁷ See *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, Report and Order, 29 FCC Rcd 4127 (2014).

¹⁸ See *Vehicle-to-Vehicle Communications Research Project (V2V-CR)*, DSRC and Wi-Fi Baseline Cross-channel Interference Test and Measurement Report, Pre-Final Version (Dec. 2019).

properly analyzed, as directed by the 2016 U-NII Devices Order.¹⁹ Thus, the FCC abandoned its unfinished interference testing.²⁰ Yet, the Commission—without consideration of data from interference testing—has proposed to reserve the majority of the spectrum for unlicensed use and has abandoned the possibility of spectrum sharing. The Commission should continue its ongoing testing in conjunction with NTIA and DOT to determine whether and how the band could be shared with unlicensed devices through its Phase II and Phase III testing plans. Additionally, this testing should be expanded as new V2X technologies emerge, including Next Generation V2X (IEEE 802.11bd) and 5G C-V2X (3GPP Rel 16).

IV. THE UNBALANCED PROPOSAL SACRIFICES POTENTIALLY LIFE-SAVING TECHNOLOGY FOR A MARGINAL INCREASE IN UNLICENSED SPECTRUM

The NPRM asks whether reserving 45 megahertz for unlicensed use in the 5.9 GHz band “makes much sense [given that] the Commission is already on the path to make substantial mid-band spectrum available for 5G[.]”²¹ GM’s answer is “no.” Reallocating 45 megahertz from safety-enhancing ITS to unlicensed (including Wi-Fi) is not a balanced approach, especially because the instant proceeding is only one of several simultaneous FCC proceedings seeking comment on enormous allocations of unlicensed spectrum.²²

¹⁹ See *The Commission Seeks To Update and Refresh The Record In The 'Unlicensed National Information Infrastructure (U-NII) Devices In The 5 GHz Band' Proceeding*, ET Docket No. 13-49, 31 FCC Rcd 6130 (June 1, 2016).

²⁰ See *Office of Engineering & Technology Requests Comment on Phase I Testing of Prototype U-NII-4 Devices*, Public Notice, ET Docket No. 13-49, 33 FCC Rcd 10766 (Oct. 29, 2018) (recognizing that “there have been a number of developments since the three-phase test plan was announced in 2016,” including the introduction of new technologies for autonomous vehicles and the development of cellular vehicle-to-everything (C-V2X)). *Id.* at 2.

²¹ NPRM, 34 FCC Rcd at 12615-16 ¶ 30.

²² See *id.* (“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.”).

The Commission has authorized or proposed to authorize an additional 1,325 megahertz of unlicensed spectrum. This is on top of the roughly 600 megahertz already allocated for unlicensed use, which adds up to more than 1,800 megahertz available for unlicensed Wi-Fi. We urge the Commission to take a more holistic look when evaluating the facts and data submitted in support of the proposed reallocation for unlicensed uses of 60 percent of the 5.9 GHz band.²³

The NPRM’s proposed reallocation relies almost entirely on the increased consumer demand for unlicensed uses, inexplicably ignoring the parallel imperative to prevent crashes and save lives on our roadways. Even at this early stage, the record in this proceeding is replete with data supporting the tangible economic and safety benefits that would result from ITS deployments.²⁴

Moreover, the 5.9 GHz band is the only feasible option for ITS and automotive safety technology—any redesign reduces optionality and limits effectiveness. While the Commission moves ahead to amass large spectrum swaths for unlicensed use, licensed safety ITS spectrum has no option other than the 5.9 GHz band. Even at that, the NPRM proposes to cut a full 60 percent of the licensed allocation, which, if adopted, may violate Sections 312 and/or 316 of the Communications Act.²⁵

²³ Calls from the cable sector for allocating spectrum in the 5.9 GHz band are particularly dubious given the recent Wall Street Journal study concluding that faster internet speeds are “not worth it.” See Letter from NCTA to Ms. Marlene H. Dortch, Secretary, Fed. Communications Comm’n, ET Docket No. 13-49 (Oct. 16, 2019). Cf. Shalini Ramachandran *et al.* *The Truth About Faster Internet: It’s Not Worth It*, WSJ (Aug. 20, 2019) (concluding that most families need only a fraction of their available internet speed—often less than 10 Mbps—to watch high quality HD streaming video, even with up to seven video streams running simultaneously).

²⁴ See, e.g., November 20, 2019 DOT Letter (discussing the \$1 trillion+ financial effect of vehicle crashes occurring in 2017).

²⁵ In Section 312, Congress specified a narrow list of circumstances in which the FCC lawfully may revoke a license, for example, a willful or repeated failure to comply with a license or a knowingly false statement in an FCC application. See 47 U.S.C. § 312(a)(1)-(7); *Mako Comms., LLC v. FCC*, 835 F.3d 146, 152 (D.C. Cir. 2016) (characterizing Section 312 as creating an “intentional sanction” against a misbehaving licensee). The NPRM would effectively foreclose existing ITS providers from using the 5.9 GHz spectrum for innovative safety-critical applications, but nothing in Section 312 allows the FCC to revoke a license so that the agency can allocate the

A. Moving V2X out of 5.9 Is Not a Workable Solution

Even if the Commission were so inclined, the agency could not undo the harm to V2X by allocating a bandwidth outside the 5.9 GHz band. The real promise of the existence of V2X is the ability to communicate beyond the line-of-sight and around fixed objects, and few (if any) other available bandwidths share the characteristics that make 5.9 GHz ideally suited for such critical safety applications. The 5.9 GHz band also allows low-latency communication among vehicles and infrastructure, which is needed to develop safety applications that can help prevent crashes in real time. In addition to its unique physical characteristics, the international adoption of 5.9 GHz for V2X creates an economy of scale for manufacturers.

B. The NPRM Incorrectly Suggests That Sensor Technologies Operating in the 76-81 GHz Bands Are Sufficient Substitutes for V2X

Finally, the NPRM repeatedly equates the abilities of sensor technology operating in the 76-81 GHz bands with V2X technologies available or soon to launch in the 5.9 GHz Band. The NPRM seems to rely heavily on this inaccuracy as support for drastically cutting the ITS allocation. But the radar sensor technologies operating in the 76-81 GHz bands and the communication devices for V2X technology operating in the 5.9 GHz band are completely different.

First, the radar sensor systems that use the 76-81 GHz band operate as direct line-of-sight detectors and cannot provide the “360-degree” awareness for the driver/vehicle within a 300-1000 meter range—*e.g.*, these systems cannot “see” around corners or “through” other vehicles

spectrum to another use. *See, e.g., Halverson v. Slater*, 129 F.3d 180, 185 (D.C. Cir. 1997) (Under *expressio unius*, Congress meant to exclude items not mentioned in an enumerated list). Likewise, the NPRM would violate Section 316, which allows only a modest or incremental change to an existing license. *See MCI Telecommunications Corp. v. AT&T*, 512 U.S. 218, 228-29 (1994) (in ordinary language, “modify” means a modest or moderate change). Rather than a “moderate” change; however, the NPRM would fundamentally change existing relationship by preventing the ITS providers from using the 5.9 GHz spectrum for critical, safety-driven V2X technologies.

like V2X. Examples of sensor-based technologies using the 76-81 GHz band are radars for sensing vehicles directly ahead or in blind spots to assist drivers with avoiding collisions. In stark contrast, the V2X systems in the 5.9 GHz band are able to send and receive messages from vehicles or infrastructure that are much further ahead or out of sight, providing warnings or intervention in scenarios where the onboard sensors technology mentioned above are limited (*i.e.*, there's no line of sight), such as vehicles approaching intersections. But V2X also has potential to go further than simply providing warnings—it can help enable a strong, fully interconnected nationwide interoperable machine-to-machine system designed for advanced crash-avoidance and automation features.

For a real example of where V2X sensing has benefit over other onboard sensing, NHTSA conducted an analysis of two potential crash avoidance applications, “intersection movement assist” (IMA) and “left turn assist” (LTA). The analysis found that there could be an average 50-percent reduction in crashes, injuries, and fatalities for these two scenarios. Applied to the full national vehicle fleet, this could potentially reduce 400,000 to 600,000 crashes; 190,000 to 270,000 injuries and save 780 to 1,080 lives each year, just from these two applications alone. The addition of other V2V and vehicle-to-infrastructure (V2I) safety applications would have additional benefits. In total, NHTSA has estimated that these applications could potentially avoid or reduce the severity in up to 80 percent of non-impaired crashes. No other known safety technology has the potential to do so much.

V. THE NPRM IS PREMATURE: THE COMMISSION SHOULD COMPLETE TESTING IN THE FULL 75 MEGAHERTZ SPECTRUM ALLOCATION

The NPRM unnecessarily truncates the well-established process through which the Commission and DOT have closely coordinated to test and analyze results. GM urges the Commission to coordinate with DOT to complete the requisite testing while, at the same time,

the automobile manufacturers work together to achieve a framework to support commitments to deploy V2X technologies at scale and in a timely manner in the United States.

A. The 5.9 GHz In-Band Testing For DSRC Has Not Been Completed and Must Be Undertaken for C-V2X

The Commission’s 2006 order adopting service and licensing rules for the 5.9 GHz band stated that DSRC “provides the critical communications link for [ITS],” and would help “reduc[e] highway fatalities” and “save lives by warning drivers of an impending dangerous condition or event in time to take corrective or evasive actions.”²⁶ Thereafter, DOT released a “DSRC-Unlicensed Device Test Plan that described tests to characterize the existing radio frequency signal environment and identify the impacts to DSRC operations if unlicensed devices operate in the [5.9] GHz band.”²⁷ Next, as noted earlier, the FCC’s Office of Engineering and Technology (“OET”) announced a process “to update and refresh the record” in order to “build[] on efforts to date by the Commission, the [DOT], and the automotive and communication sectors to evaluate potential sharing techniques” and to examine the “status of potential sharing solutions between proposed Unlicensed National Information Systems.”²⁸ Most recently, OET released and sought comment on a report for tests performed to evaluate potential sharing solutions between the proposed U-NII devices and DSRC operations in the 5.9 GHz band.²⁹

²⁶See *Amendment of the Commission’s Rules Regarding Dedicated Short-Range Communications in the 5.850-5.925 GHz Band*, WT Docket No. 01-90; *Amendment of Parts 2 and 90 of the Commission’s Rules to Allocate the 5.850-5.925 GHz Band to the Mobile Service* ET Docket No. 98-95, 21 FCC Rcd 8961 (2006).

²⁷ See DSRC-Unlicensed Device Test plan, version 3.5.3, U.S. Dept. of Transp., ITS—Joint Program Office (Test Plan—Aug. 2015) (“DOT 2015 Test Plan”).

²⁸ *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, ET Docket No. 13-49, 31 FCC Rcd 6130 (2016).

²⁹ See *Office of Engineering and Technology Requests Comment on Phase I Testing of Prototype U-NII-4 Devices*, Public Notice, ET Docket No. 13-29, 33 FCC Rcd 10766 (2018).

The NPRM, however, pushes forward without consideration of these results and outside the bounds of this well-established process. GM strongly supports completing this testing and similar testing for C-V2X radios. Neither the agencies nor interested parties can make conclusions about the proposal set forth in the NPRM absent the empirical data produced by these tests.

Finally, we note two additional procedural points. First, the NPRM does not propose or seek comment on whether the testing undertaken by OET and DOT ought to be completed. Soliciting comments on this fundamental question would greatly inform the proceeding's fundamental question: whether ITS and unlicensed uses are capable of co-existing. Second, the NPRM does not include either data in support of or a cogent rationale for reserving 45 megahertz—a full 60 percent³⁰ of the licensed 5.9 GHz band—for unlicensed uses. In sum, the band plan set forth in the NPRM fails to ensure that V2X communications are protected from harmful interference. Accordingly, we strongly encourage additional testing to identify the amount of cross-channel interference to V2X and establish rules to prevent harmful interference.

B. An Array of Bipartisan Policymakers Have Urged the Commission Not To Prematurely Limit the Use of Spectrum Allocated for Automotive Safety Uses

Federal and state policymakers of both political parties have expressed general concern about the NPRM and requested that the Commission not act until testing is completed. For example, in August 2019, Representatives Debbie Dingell and Fred Upton wrote to Chairman Pai:

Whether the forthcoming NPRM maintains this precise [testing] format or not, we urge the FCC to not open the 5.9 GHz Band from unlicensed use

³⁰ We note that while the NPRM proposes to reallocate 60 percent of the full band, given that the interference issues have not been addressed, the percentage of spectrum unusable for ITS is likely higher.

until all rigorous, meaningful testing is completed and clearly demonstrates that unlicensed devices can operate harmoniously with all VX technologies without causing harmful interference and jeopardize automotive and pedestrian safety.³¹

The letter adds, “we are concerned that any non-data driven reallocation of the band could jeopardize and/or render these promising automotive safety-critical technologies.”³²

In January, Members of the U.S. House Committee on Transportation and Infrastructure—from both the majority and minority—wrote to Chairman Pai and all of the FCC commissioners to express “alarm” with the proposals set forth in the NPRM and to urge the Commission to consider the potential to save thousands of lives by reserving the entire 5.9 GHz band for safety-critical ITS uses.³³ In addition, the Members wrote about their “serious outstanding questions about the potential implications of” the approach laid out in the NPRM and urged the Commission “to reconsider the approach[.]”³⁴

Finally, in a letter to Chairman Pai, Secretary Chao expressed “significant concerns with the Commission’s proposal, which represents a major shift in the FCC’s regulation of the 5.9 GHz band and jeopardizes the significant transportation safety benefits that the allocation of this Band was meant to foster.”³⁵

³¹ Letter from Representative Debbie Dingell, Member of Congress, and Representative Fred Upton, Member of Congress, to Ajit Pai, Chairman, Fed. Commc'ns Cmm'n, August 2, 2019 at 2.

³² *Id.* at 1.

³³ *See* Letter from Members of the U.S. House Committee on Transp. and Infrastructure to Ajit Pai, Chairman, and Commissioners Michael O’Rielly, Brendan Carr, Jessica Rosenworcel, and Geoffrey Starks, Fed. Commc'ns Cmm'n, Jan. 22, 2020 at 2.

³⁴ *Id.* at 5.

³⁵ November 20, 2019 DOT Letter at 1.

In short, we encourage the Commission to work closely and collaboratively with its federal and state government partners to make a final determination regarding the spectrum needs for automotive safety.

VI. THE NPRM OVERLOOKS THE SAFETY AND MARKET-ENHANCING BENEFITS FROM INTELLIGENT TRANSPORTATION SYSTEMS BUILD-OUT

Just as with the communication sector, the automotive marketplace best determines technology choices, not burdensome regulation. GM urges the Commission to retain the entire 5.9 GHz band for ITS applications rather than jeopardize the multitude of safety and economic benefits. In fact, meaningful steps to ensure an innovative and dynamic transportation and vehicular-safety network now and into the future are in place, as discussed below.

A. Retaining the 5.9 GHz Band for Automotive Safety is Important for American Global Competitiveness in the Automotive Sector

The band is currently largely harmonized internationally due to its unique characteristics.³⁶ In addition to the United States allocation, the ITU reports that the 5.9 GHz band is “assigned for cooperative systems in Europe, as well as some in the Asia-Pacific region.”³⁷ At least Europe, Canada, Australia, and Korea have all allocated 70 megahertz or more in the 5.9 GHz band for ITS and automotive safety.³⁸ China also acted to allocate spectrum in the 5.9 GHz band and has announced plans to enable a connected vehicle future for China’s transportation ecosystem.³⁹ International harmonization creates economies of scale—which

³⁶ See *Intelligent transport systems (ITS) usage*, ITU, Report ITU-R M.2445-0 (Nov. 2018) (“ITU ITS Report”) at § 7.1.

³⁷ See *id.*

³⁸ See Pablo Valerio, *As more connected cars hit the road, the battle for wireless spectrum increases*, IoT Times, (Aug. 29, 2019).

³⁹ See *id.*; see also Hong Kong Lawyer, *The National Development and Reform Commission (NDRC) Circulates Draft of Smart Car Strategy* (Apr. 4, 2018).

would result in greater innovations, decreased costs, and efficient product distribution—all for the benefit of U.S. ITS market participants.

The U.S. has been a leader in the automotive industry for over 100 years. GM Chairman and CEO Mary Barra has said that the automotive industry will change more in the next five years than the past 50.⁴⁰ We urge the Commission to keep the 5.9 GHz band dedicated to automotive safety to help ensure that automotive innovation continues to flourish in America and to maintain American global competitiveness in the automotive space.

B. The Commission Should Afford Flexible Use for ITS Operations in the 5.9 GHz Band

The proposal incorporates a “command-and-control” rule structure even though this approach has been out of favor for more than 20 years.⁴¹ Flexible allocations yield more efficient and innovative spectrum markets, and for that reason, Congress and the FCC long ago expressed a preference for flexible use.⁴² If adopted, the proposal to allocate only 30 megahertz (20 megahertz for C-V2X and 10 megahertz for DSRC or all 30 for C-V2X) would inappropriately intervene in the ITS marketplace. Similarly, the NPRM solicits input on whether to permit flexible users in the 5.9 GHz band or to mandate a particular technology standard or standards—*i.e.*, “command-and-control.”

⁴⁰ See Remarks of GM Chairman and CEO to Consumer Electronics Show (Jan. 6, 2016).

⁴¹ See, e.g., *Principles for Promoting the Efficient Use of Spectrum by Encouraging the Development of Secondary Markets*, Policy Statement, 15 FCC Rcd 24178, 24180, ¶ 8 (2000) (discussing the Commission’s recognition that “the best way to realize the maximum benefits from the spectrum is to permit and promote the operation of market forces” and concluding that “competing users of spectrum need flexibility to respond to market forces and demand”); *Report of the Spectrum Efficiency Working Group*, FCC Spectrum Policy Task Force, at 33 (Nov. 15, 2002) (noting that “more flexible uses may increase the supply of new innovations and services” and that “increased flexibility will be a key component of any policy that successfully promotes the efficient use of spectrum”); *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Notice of Proposed Rulemaking, WT Docket No. 00-230, 15 FCC Rcd 24203 (2000).

⁴² See, e.g., 47 U.S.C. § 303(y) (empowering the Commission to “allocate electromagnetic spectrum so as to provide flexibility of use”); Amendment of Section 2.106 of the Commission’s Rules to Allocate Spectrum at 2 GHz for use by Mobile Satellite Service, IB Docket No. 01-185, ET Docket No. 95-18, Notice of Proposed Rulemaking, 16 FCC Rcd 15532, 15533 ¶ 2 (2001) (“Flexibility has been the Commission’s favored approach to spectrum management and licensing in recent years.”).

The Commission long-ago recognized the benefits associated with flexible use policies. Flexible use facilitates greater innovation and better ensures that spectrum can be and is used for its best and highest purpose—as opposed to command-and-control, which restricts operators to a single technology or offering. The Commission has expressly stated, “the best way to realize the maximum benefits from the spectrum is to permit and promote the operation of market forces” and concluded that “competing users of spectrum need flexibility to respond to market forces and demand”.⁴³ Flexible allocations yield more efficient and innovative spectrum markets, and for that reason, Congress and the FCC long ago expressed a preference for flexible use.⁴⁴

The Commission should afford the auto manufacturers the flexibility to develop and introduce new safety-essential communication technologies into the ITS-allocated band—rather than mandate that certain technologies have access to only a certain limited portion of the 5.9 GHz band. Likewise, the Commission need not favor one technology over another by deciding which ought to receive greater allocated bandwidth. (As noted earlier, the 10 megahertz allocated for DSRC would be useless in any event.) Under a flexible-use paradigm, the Commission would establish technical rules that would permit co-existence as long as the possibility of harmful interference to and among the users is fully mitigated.

⁴³ *Principles for Promoting the Efficient Use of Spectrum by Encouraging the Development of Secondary Markets*, Policy Statement, 15 FCC Rcd 24178, 24180 ¶ 8 (2000). See also, *Report of the Spectrum Efficiency Working Group, FCC Spectrum Policy Task Force*, at 33 (Nov. 15, 2002) (noting that “more flexible uses may increase the supply of new innovations and services” and that “increased flexibility will be a key component of any policy that successfully promotes the efficient use of spectrum”); *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Notice of Proposed Rulemaking, WT Docket No. 00-230, 15 FCC Rcd 24203 (2000).

⁴⁴ See, e.g., 47 U.S.C. § 303(y) (empowering the Commission to “allocate electromagnetic spectrum so as to provide flexibility of use”); Amendment of Section 2.106 of the Commission’s Rules to Allocate Spectrum at 2 GHz for use by Mobile Satellite Service, IB Docket No. 01-185, ET Docket No. 95-18, Notice of Proposed Rulemaking, 16 FCC Rcd 15532, 15533 ¶ 2 (2001) (“Flexibility has been the Commission’s favored approach to spectrum management and licensing in recent years.”).

C. The Proposal Would Extinguish the Public and Private Sector Deployments Existing in the 5.9 GHz Band and Related Economic Benefits

If adopted, the proposal set forth in the NPRM would strand significant public and private investment. Given this significant concern, leaders of all 50 state departments of transportation, the District of Columbia, and Puerto Rico requested that the Commission “continue our nation’s commitment to improving transportation safety by reserving the 5.9 GHz wireless spectrum for this critical purpose.”⁴⁵

The U.S. federal government has lately taken concrete actions to make available funding for activities involving ITS roll-out. In January, DOT separately announced the availability of \$38 million for development of connected-vehicle technology to prevent accidents involving first responders⁴⁶ and the availability of almost \$1 billion —\$906 million—for Infrastructure for Rebuilding America (INFRA) grants, which support highway and bridge projects.⁴⁷ These recent events highlight that V2X has forward momentum, and that the Commission should look to the transportation ecosystem to decide how best to deploy technology into the licensed 5.9 GHz band.

In addition, as of December 6, 2019, the Commission has granted to 35 states authorizations to operate V2X in the 5.9 GHz band.⁴⁸ Likewise, 66 V2X projects are underway and 57 are operational.⁴⁹ Further, the Michigan Department of Transportation alone has 120

⁴⁵ Letter to Ajit Pai, U.S. Fed. Commc'ns Cmm'n, from Carlos Braceras, President, AASHTO (Aug. 19, 2019).

⁴⁶ See *U.S. Transportation Secretary Elaine Chao Announces New Initiatives to Improve Safety on America's Roads*, U.S. Dept. of Trans. News Release (Jan. 15, 2020).

⁴⁷ See *U.S. Transportation Secretary Elaine Chao Announces Availability of More Than \$900 Million for Infrastructure Investments Across America*, U.S. Dept. of Trans. News Release (Jan. 13, 2020).

⁴⁸ *States with Active 5.9 GHz Intelligent Transportation Services (ITS) Licenses*, U.S. Department of Transportation, (Dec. 6, 2019).

⁴⁹ See *The Safety Band*, U.S. Dept. of Trans. (interactive) (https://www.transportation.gov/sites/dot.gov/files/2020-02/59-fact-sheet-deployment-map_0.pdf); see also, *The 5.9 GHz Band: Where is the Safety Band Being Used?*, U.S. Dept. of Trans. (undated).

applications for licensure for new technology that would utilize the 5.9 GHz spectrum. In addition to applications pending by the Michigan Department of Transportation, there are approximately 500 such applications pending before the Commission.⁵⁰ Both this NPRM and the delay to act upon applications for projects utilizing the 5.9 GHz spectrum for transportation hinders Americans from benefitting from safer roadways.

Likewise, if adopted, the proposal would curtail the promise of improved automotive safety and the associated economic benefits. As noted earlier, NHTSA has estimates that, at full deployment, V2X technology has potential to benefit over 80 percent of non-impaired light vehicle to light vehicle crashes. For perspective, if avoiding that percentage of crashes saved even half of auto fatalities, V2X deployment would yield a recurring benefit of over \$192 billion per year. Accordingly, GM urges the Commission to maintain the 75-megahertz allocation in the 5.9 GHz band for ITS and automotive safety. Advanced ITS that integrates sophisticated innovative features is within arm's reach.

VII. CONCLUSION

In consideration of the renewed and promising industry-wide effort to move forward with a coordinated ITS deployment at-scale, together with the factors set forth above, GM respectfully urges the Commission to preserve the full 75 megahertz allocation in order to complete the out-of-band interference testing and to work with the transportation sector to define a deployment plan, prior to making decisions about the future of this band.

⁵⁰ *Dingell Presses FCC Chairman on Jeopardizing Safety on Roads*, News from U.S. Congresswoman Debbie Dingell, Press Release (Dec. 12, 2019).

Respectfully submitted,

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