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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June 2, 2020

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I. INTRODUCTION AND SUMMARY

The Alliance for Automotive Innovation ("Auto Innovators"), which represents the automotive ecosystem in the U.S., including 38 automakers, suppliers, and technology companies, hereby submits comments on the Federal Communications Commission's ("FCC" or "Commission") *Further Notice of Proposed Rulemaking* in the above-captioned proceeding.[1] The automotive industry remains committed to optimizing use of the 5.9 GHz band for vehicle-to-everything ("V2X") technologies. The dynamic companies represented by Auto Innovators continue to develop and deploy innovative V2X solutions that will deliver significant safety and societal benefits to the American public, including reducing automotive crashes and fatalities and producing economic, environmental, and transportation efficiencies. In these comments, Auto Innovators recommends specific steps that the Commission should take to ensure that V2X can be successfully and efficiently deployed in the near term following the Commission's decision to reduce the 5.9 GHz spectrum allocation for V2X from 75 megahertz to 30 megahertz.

[1] *Use of the 5.850-5.925 GHz Band*, First Report & Order, Further Notice of Proposed Rulemaking, & Order of Proposed Modification, 35 FCC Rcd 13440 (2020) ("*5.9 GHz Order*" or "*FNPRM*").

First, the Commission should promote the smooth and rapid deployment of cellular vehicle-to-everything ("C-V2X") technology in the upper segment of the 5.9 GHz band by expeditiously issuing licenses to qualified users and requiring unlicensed entrants in the lower 45 megahertz segment of the band to pay for transitioned licensees' relocation costs. *Second*, the Commission should implement safeguards to ensure that V2X can operate free from harmful interference. Such interference protections should include spectral density limits, out-of-band emission ("OOBE") limits, and restrictions on client-to-client ("C2C") communications for unlicensed Wi-Fi operating in the lower 45 megahertz of the 5.9 GHz band. *Third*, the Commission should adopt technical parameters designed to permit V2X operators to unleash the full potential of this groundbreaking technology for consumers. *Fourth*, the Commission should expeditiously identify and make available additional spectrum to support the successful deployment of advanced V2X applications, including those supported by next-generation V2X technologies such as 5G-V2X. These steps will promote successful deployment of V2X technologies in the upper portion of the 5.9 GHz band and aid the automotive industry in continuing to develop and put to use innovative solutions that benefit all roadway users.

II. THE COMMISSION SHOULD STREAMLINE THE TRANSITION IN THE UPPER 30 MEGAHERTZ OF THE 5.9 GHZ BAND.

The Commission's *5.9 GHz Order* split the 5.9 GHz band into an upper 30 megahertz for V2X, specifically C-V2X, and a lower 45 megahertz for unlicensed use.[2] The Commission must now take critical steps to ensure the successful and efficient deployment of V2X technologies under this new framework. Auto Innovators has identified the following methods for ensuring a

[2] *Id*.

smooth transition and helping the automotive industry put the upper portion of the band to good use in the near term.

A. The FCC Should Rapidly Enable Use of the Upper Portion of the 5.9 GHZ Band for C-V2X.

The Commission should allow C-V2X deployments in the upper 30 megahertz portion of the 5.9 GHz band as soon as practicable. Equipment and vehicle manufacturers are ready to deploy C-V2X in the band now,[3] and these deployments should not be unnecessarily delayed. To that end, we recommend that the transition timeframe be two years from the effective date of the *5.9 GHz Order*, rather than two years from an order adopted in response to this *FNPRM*.[4] Such a transition period should provide sufficient time for existing DSRC deployments operating in the upper 30 megahertz of the band to transition to C-V2X. During the transition period, the Commission should aggressively use grants of special temporary authority, experimental licenses, or other processes to permit operation of C-V2X.

However, unnecessarily prolonging the need for grants of special temporary authority, experimental licenses, or other processes for C-V2X beyond what is reasonably necessary for existing DSRC deployments in the upper 30 megahertz to transition to C-V2X would be problematic. C-V2X users need long-term authorizations for business planning and certainty. Repeatedly filing for new or extensions of temporary authority would be an unnecessary burden on C-V2X operators and the FCC staff responsible for processing such requests. Moreover,

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[3] For example, Ford is planning to roll out C-V2X in all vehicles in 2022. *See, e.g.*, Letter from Mitch Bainwol, Chief Gov't Affairs Officer, Ford Motor Company, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-138 (filed Sept. 24, 2020).

[4] *See FNPRM* ¶ 147 (proposing that all ITS operations in the 5.895-5.925 GHz band either convert to C-V2X or cease operating two years after the effective date of a Second Report and Order adopted in response to the Further Notice).

forcing users to rely on temporary authorizations could discourage aggressive deployment in the band.

At the same time, the Commission should not terminate DSRC licensee use of the 5.9 GHz band prematurely. The 5.9 GHz band is actively being used by state transportation systems as well as private industry partners for connected vehicle deployments and testing at a number of locations.[5] The Commission can allow for these tests and deployments to conclude and transition to C-V2X, as needed, by providing a reasonable two-year transition.

B. Unlicensed Operators in the Lower 45 Megahertz of the 5.9 GHz Band Should Reimburse DSRC Licensees for All Transition Costs.

The Commission can take a meaningful step to facilitate DSRC licensees' efficient transition to C-V2X in the upper portion of the 5.9 GHz band by providing compensation for such relocation. V2X licensees displaced due to the coming involuntary transition out of the lower 45 megahertz of the 5.9 GHz band should be compensated for relocation costs by unlicensed new entrants.[6] Specifically, as previously suggested, Auto Innovators urges the FCC to require unlicensed entrants to pay "the reasonable costs incurred by existing V2X licensees transitioning" either out of the 5.9 GHz band, or to the upper 30 megahertz of the band.[7]

This approach is merited and consistent with Commission precedent. For example:

- In the *Emerging Technologies Memorandum Opinion and Order*, the FCC concluded that in the event of an involuntary relocation of a 2 GHz band

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[5] *See, e.g.*, *Interactive Connected Vehicle Deployment Map*, U.S. Dep't of Transp. (last updated Mar. 31, 2021), https://www.transportation.gov/research-and-technology/interactive-connected-vehicle-deployment-map.

[6] *See FNPRM* ¶ 167.

[7] *Ex parte* letter from Scott D. Delacourt, Counsel to the Alliance for Automotive Innovation, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-138, at 4 (filed Nov. 10, 2020) ("November 10 *Ex Parte*").

incumbent, the emergency technology service provider seeking spectrum access would pay all relocation costs.[8]

- In the *800 MHz Rebanding* proceeding, the FCC required Nextel to pay incumbent relocation costs in the 800 MHz band.[9]
- This framework was also recently used in the *C-band Order*.[10]

To further the objectives of the *5.9 GHz Order*, encourage rapid transition to the 30 megahertz portion of the band dedicated for V2X, and promote efficient and effective use of the spectrum allocation, the Commission should require unlicensed new entrants to the band to compensate V2X incumbents for their reasonable relocation costs.

III. THE COMMISSION SHOULD IMPLEMENT SAFEGUARDS TO PREVENT HARMFUL INTERFERENCE FROM UNLICENSED TO V2X OPERATIONS.

Since V2X operations will be limited to the upper 30 megahertz of the 5.9 GHz band, it is more important than ever that these operations occur absent the threat of harmful interference. Despite estimates from the U.S. Department of Transportation that the entire 75 megahertz of the band is needed for V2X safety applications,[11] the Commission has now made less than half of that available for use by V2X. Auto Innovators urges the Commission to ensure reliable access to that spectrum—free from harmful interference from nearby unlicensed operations. To that

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[8] *Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies*, Memorandum Opinion and Order, 9 FCC Rcd 1943, 1948, ¶ 35 (1994).

[9] *Improving Public Safety Communications in the 800 MHz Band*, Report and Order, Fifth Report and Order, Fourth Memorandum Opinion, and Order, 19 FCC Rcd 14969, ¶ 31 (2004).

[10] *See Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Report and Order and Order of Proposed Modification, 35 FCC Rcd 2343, ¶ 21 (2020) ("Relying on the Emerging Technologies framework, we adopt a process to relocate FSS operations into the upper 200 megahertz of the band, while fully reimbursing existing operators for the costs of this relocation and offering accelerated relocation payments to encourage a speedy transition.")

[11] Comments of the U.S. Dep't of Transp., ET Docket No. 19-138, at 30-32 (filed Mar. 13, 2020) ("DOT Comments").

end, the Commission should impose essential safeguards to protect V2X from harmful interference.

The automotive industry continues to have significant concerns about the impact of unlicensed operations on V2X receivers. To mitigate this risk, the Commission should first impose a spectrum density limit on portable unlicensed devices that may be temporarily operating outdoors while connected to an indoor access point.[12] The Commission should ensure that productive use of the upper portion of the 5.9 GHz band is not limited by the threat of harmful interference.

Second, the Commission should promulgate stringent OOBE limits for outdoor unlicensed use occurring in the U-NII-4 Band.[13] The FCC proposes outdoor OOBE limits for unlicensed devices of "-5 dBm/MHz at 5.895 GHz, decreasing linearly to -27 dBm/MHz at 5.925 GHz, measured using an RMS measurement."[14] The Commission should not implement these limits, as proposed by unlicensed advocates,[15] as doing so would likely result in harmful interference to V2X communications. To protect V2X communications from harmful interference, Auto Innovators supports OOBE limits, measured using RMS measurements, of:

- For indoor Access Points: -5 dBm/MHz at 5.895 GHz decreasing linearly to -27 dBm/MHz at 5.925 GHz;

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12 As the Commission acknowledges, both 5GAA and Qualcomm support imposition of this type of limit. *FNPRM* ¶ 178.

13 As Auto Innovators previously explained, strict OOBE limits are necessary to prevent harmful interference to critical V2X operations. *See* November 10 *Ex Parte* at 5 ("The Commission should proceed cautiously in permitting outdoor U-NII-4 band operations in any segment of the 5.9 GHz band, as it is necessary to protect co-channel federal radiolocation operations as well as co-channel and adjacent-band V2X operations from harmful interference.").

14 *FNPRM* ¶ 183.

15 *Id.* ¶ 181.

- For client devices: -25 dBm/MHz at 5.895 GHz decreasing linearly to -47 dBm/MHz at 5.925 GHz; and
- For fixed outdoor Access Points: -25 dBm/MHz at 5.895 GHz, decreasing linearly to -47 dBm/MHz at 5.925895 GHz.

Third, the Commission should not allow operation of C2C devices without imposing adequate safeguards to protect V2X.[16] The Commission proposes to allow "U-NII-4 client-to-client device communications at that same 23 dBm EIRP power level" as C-V2X OBUs.[17] This proposal should be rejected as it is likely to result in harmful interference to C-V2X applications through adjacent band interference.[18] Auto Innovators is aligned with the 5G Automotive Association ("5GAA") in urging the Commission to place a prohibition on U-NII-4 client-to-client operations. The Commission should impose meaningful technical parameters on unlicensed use to ensure that V2X can function optimally and deliver benefits to all roadway users.

IV. THE COMMISSION SHOULD ADOPT TECHNICAL PARAMETERS FOR THE UPPER 30 MEGAHERTZ OF THE 5.9 GHZ BAND THAT ENABLE THE POTENTIAL OF C-V2X TO BE UNLEASHED.

The automotive industry needs a clear path to make the most of the spectrum that remains for V2X. Given that the Commission repurposed over half of the 5.9 GHz band—which was

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16 *See* Comments of the Alliance for Automotive Innovation, ET Docket No. 18-295, GN Docket No. 17-183, at 3 (filed Feb. 22, 2021) ("Auto Innovators Comments") ("The Commission should not remove the prohibition on [C2C] communications unless there is sound assurance that such communications will not interfere with incumbent users, including V2X.").

17 *FNPRM* ¶ 188.

18 *See Ex parte* letter from Sean T. Conway, Counsel for 5G Automotive Association, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-138, at 2 (filed Nov. 10, 2020) ("[T]he Commission should develop a further record on the impact of in-vehicle UNII-4 client-to-client and mobile access point operations on adjacent band C-V2X services. As 5GAA and others previously have explained, real-world testing demonstrates that, without adequate OOBE protections, in-vehicle U-NII-4 access point and client-to-client operations would reduce the effectiveness of C-V2X safety services.").

originally reserved for V2X—for unlicensed use in the *5.9 GHz Order*, the agency should adopt technical parameters that facilitate optimized use of the remaining spectrum for C-V2X operators. To maximize the utility of the upper 30 megahertz of the 5.9 GHz band, the Commission should revise its Part 90 power limits to allow greater flexibility for C-V2X operations. Additionally, the agency should maintain the existing hierarchical priority system for ITS messages. Finally, as recommended in the *FNPRM*,[19] the FCC should permit the industry standards-setting process to decide channelization issues within the band segment.

Auto Innovators first urges the Commission to allow higher power levels for C-V2X on-board units ("OBUs") and roadside units ("RSUs").[20] The Commission should adopt the 5GAA recommendation that the FCC adopt maximum EIRP levels of 33 dBm for both C-V2X OBUs and RSUs,[21] as raising this limit will provide more flexibility for C-V2X operations. Second, if the FCC adopts OOBE limits for C-V2X, it should use the slightly more relaxed limits proposed by 5GAA rather than the limits proposed in the *FNPRM*.[22] These adjustments will "facilitate both C-V2X's evolution and more robust safety services for travelers" given V2X's reduced spectrum allotment.[23]

Third, the Commission should maintain its current safety-of-life/safety/non-safety-of-life framework for message prioritization.[24] Specifically, when safety-of-life messages are competing for spectrum with other messages, safety-of-life messages should always be

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19 *FNPRM* ¶ 155.

20 *See id.* ¶ 161.

21 Comments of the 5G Automotive Association, ET Docket No. 19-138, at 27 (filed Mar. 9, 2020) ("5GAA Comments").

22 *FNPRM* ¶ 163.

23 5GAA Comments at 27.

24 *FNPRM* ¶ 151.

prioritized. In addition, safety-related messages should continue to receive priority over non-safety-of-life messages.

Additionally, per its proposal in the *FNPRM*, the Commission should "leave the issue of how best to use any of the channels to the standards-setting process and permit the industry to agree on use standards, but not designate those in [FCC] Rules."[25] Industry is best situated to resolve channelization issues regarding how to use the spectrum most efficiently. Similarly, industry should have flexibility to determine the use designations of the specific channels through industry standards organizations such as SAE International.

V. IT IS IMPERATIVE THAT THE COMMISSION MAKE ADDITIONAL SPECTRUM AVAILABLE TO SUPPORT V2X.

It remains critically important that the Commission make additional spectrum available for emerging V2X technologies. As is well documented throughout this proceeding,[26] V2X requires 75 megahertz—or more—of spectrum to unlock the full array of benefits for the American people.[27] The current 30 megahertz allotment for V2X is insufficient to support advanced use cases and prevents technological evolution to more data-intensive functions, such

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25 *Id.* ¶ 155.

26 *See, e.g.* DOT Comments at 2 ("Reducing the spectrum available for V2X communications from 75 MHz to 30 MHz . . . will reduce the utility of V2X by severely limiting the amount and type of messages that can be sent at any one time. Such a restriction will also hamper the future development of cooperative automated driving systems, given their expected spectrum needs."); *id*. at 32; *id*. at App'x C (titled "Loss of Benefits –More than 30 MHz needed to achieve V2I and Other V2X Benefits"); Comments of General Motors, LLC, ET Docket No. 19-138, at 8 (filed Mar. 9, 2020) (noting that V2X applications designed to aid vulnerable road users in urban areas, such as pedestrians and bicyclists, stand to be limited or lost entirely if they have only 20 or 30 megahertz in which to operate); Comments of the Ford Motor Company, ET Docket No. 19-138, at 8-9 (filed Mar. 9, 2020) ("[A] minimum of an additional 40 MHz in the 5.9 GHz band will be needed soon for advanced ITS applications" featuring larger payloads and multi-way data exchanges such as sensor sharing, intent/trajectory sharing, vulnerable road user safety, and platooning for trucking).

27 *FNPRM* ¶ 190.

as complex interactions and cooperative driving.[28] As both the Car 2 Car Communication Consortium and 5GAA have stated, these use cases would require at least 70 megahertz of direct communications spectrum.[29] Moreover, additional spectrum will be needed to support next generation V2X technologies, such as 5G-V2X. Certainly, failure to prepare for evolution to 5G would be counterproductive to the Commission's commitment to ensuring there is adequate spectrum for 5G technologies.[30] The Commission should fulfill its obligation to put the nation's airwaves to their highest and best uses and continue to work on identifying suitable spectrum for V2X.

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[28] Car 2 Car Communication Consortium, Guidance for Day 2 and Beyond Roadmap, at 13 (Sept. 25, 2019), https://www.car-2-car.org/fileadmin/documents/General_Documents/C2CCC_WP_2072_RoadmapDay2AndBeyond.pdf; 5GAA, A Visionary Roadmap for Advanced Driving Use Cases, Connectivity Technologies, and Radio Spectrum Needs, at 9 (2020), https://5gaa.org/wp-content/uploads/2020/09/A-Visionary-Roadmap-for-Advanced-Driving-Use-Cases-Connectivity-Technologies-and-Radio-Spectrum-Needs.pdf.

[29] *See* Car 2 Car Communication Consortium, Position Paper on Road Safety and Road Efficiency Spectrum Needs in the 5.9 GHz for C-ITS and Cooperative Automated Driving, at 6 (Feb. 28, 2020), https://www.car-2-car.org/fileadmin/documents/General_Documents/C2CCC_TR_2050_Spectrum_Needs.pdf ("A communication technology independent spectrum analyses presented in this paper confirmed by vehicle manufacturers show that at least 70 MHz bandwidth will be needed for today's well defined C-ITS applications. . . ."); 5GAA, 5GAA TR S-200137: Working Group Standards and Spectrum Study of Spectrum Needs for Safety Related Intelligent Transportation Systems – Day 1 and Advanced Use Cases, at 4 (June 25, 2020), https://5gaa.org/wp-content/uploads/2020/06/5GAA_S-200137_Day1_and_adv_Use_Cases_Spectrum-Needs-Study_V2.0-cover.pdf ("[I]t is clear that the 70-75 MHz of ITS spectrum in the 5.9 GHz band (as presently allocated in many regions and under consideration in other regions) is needed to support the basic safety and advanced use cases under consideration today.").

[30] The FCC has reiterated time and again its commitment to ensuring there is adequate spectrum for 5G technologies. Comments of the Alliance for Automotive Innovation, ET Docket No. 19-138, at 8 (filed Mar. 9, 2020). Acting Chairwoman Rosenworcel recently explained that ensuring adequate spectrum for 5G technologies was a Commission priority: "We need to deliver the 5G that the American people were promised. That means a 5G that is fast, secure, resilient, and—most importantly—available across the country." Press Release, FCC, Acting Chairwoman Rosenworcel Proposes Framework to Free Up Mid-Band Spectrum for 5G (Feb. 23, 2021), https://docs.fcc.gov/public/attachments/DOC-370205A1.pdf.

The Commission should strive to identify spectrum that has the necessary attributes to support V2X. To achieve economies of scale from existing deployment and implementations, the ideal spectrum for advanced V2X applications would be contiguous to the current 30 megahertz. However, if contiguous spectrum is not made available for this purpose, additional identified spectrum would also need to possess propagation characteristics that would allow for non-line-of-sight communications between vehicles and infrastructure.[31] Additionally, such new spectrum would require high quality of service standards, low latency, and uninterrupted coverage along roadways.[32] Without these attributes, it would be difficult, if not impossible, for such spectrum to support safety-of-life applications. The Commission's efforts to identify spectrum for V2X should also align with International Telecommunication Union work to identify harmonized frequency bands to support Intelligent Transportation Systems.[33] In considering additional spectrum bands for V2X, the Commission should also note that coexistence with other types of users in a band will be challenging, as many critical V2X use cases impact safety and must operate free from harmful interference.

Unfortunately, the additional spectrum alternatives proposed in the *FNPRM* do not pass muster.[34] Re-purposing the 4.9 GHz band for V2X cannot occur on any reasonable timeframe

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31 "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." Auto Innovators Comments at 30.

32 *Id.*

33 *See, e.g.* Int't Telecomm. Union, World Radiocommunication Conference 2019 (WRC-19), at v, Agenda Item 1.12, https://www.itu.int/dms_pub/itu-r/opb/act/R-ACT-ARR.1-2017-PDF-E.pdf.

34 *FNPRM* ¶ 192.

and raises questions that have not begun to be explored regarding relocation or sharing with public safety incumbents; the amount of spectrum actually available; the technical suitability of the band for V2X services and equipment; or international harmonization.[35] Spectrum in the 3450-3550 MHz band, which is set to be auctioned in October 2021, will be used for non-federal fixed and mobile operations and will continue to be shared with the U.S. Department of Defense,[36] making this spectrum already oversubscribed.

To chart a path forward, the FCC should convene a working group with the U.S. Department of Transportation and the National Telecommunications & Information Administration to identify and validate additional spectrum for V2X services. In forming its recommendations, the working group should incorporate stakeholder input and involvement.

VI. CONCLUSION

The automotive industry stands ready to continue deployment of valuable V2X technologies that promote safety and improve the quality of American drivers' user experience. Auto Innovators offers several recommendations for addressing the outstanding issues related to

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[35] The Electronic Communications Committee of the European Conference of Postal and Telecommunications Administrations ("CEPT/ECC") previously 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. Europe has already designated the 5.875-5.905 GHz band for safety-of-life V2X. *Ex parte* letter of the Association of Global Automakers, ET Docket No. 13-49, Attachment Responding to Staff Questions, at 2-3, 6-7 (filed June 28, 2017). Canada, Mexico, Korea, Singapore, Australia and China have also designated spectrum in the 5.9 GHz band for V2X. 5GAA, White Paper on ITS Spectrum Utilization in the Asia Pacific Region, at 6, https://5gaa.org/wp-content/uploads/2018/07/5GAA_WhitePaper_ITS-spectrum-utilization-in-the-Asia-Pacific-Region_FINAL_160718docx.pdf (last accessed June 2, 2021); Comments of the European Automobile Manufacturers Association and European Association of Automotive Suppliers, ET Docket No. 19-138, at 1-2 (filed Mar. 9, 2020).

[36] *Auction of Flexible-Use Service Licenses in the 3.45-3.55 GHz Band for Next-Generation Wireless Services; Comment Sought on Competitive Bidding Procedures for Auction 110*, Public Notice, FCC 21-33, ¶ 5 (rel. Mar. 18, 2021). *Facilitating Shared Use in the 3100-3550 MHz Band*, Second Report and Order, Order on Reconsideration, and Order of Proposed Modification, FCC 21-32, WT Docket No. 19-348 ¶ 15 (rel. Mar. 18, 2021).

transitioning the upper 30-megahertz segment of the 5.9 GHz band to C-V2X and protecting such uses from the threat of harmful interference. We respectfully request that the Commission adopt these recommendations and pursue policies that advance automotive safety and innovation.

Respectfully submitted,

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