

**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 5G AMERICAS

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Table of Contents

Introduction and Summary	4
Continued Advances in C-V2X Connected Car Technology	6
Technical Rules for C-V2X and U-NII-4 Operations	9
Conclusion	12

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5G Americas, the wireless industry trade association that is the voice for 5G and LTE in the Americas, submits these comments in response to the Commission’s Further Notice of Proposed Rulemaking (“*Further Notice*” or “*FNPRM*”) in the above-referenced proceeding concerning use of Cellular Vehicle-to-Everything, or C-V2X, technology, in the 5.9 GHz band allocated for Intelligent Transportation Systems Radio Services (“ITS”). Currently chaired by AT&T, 5G Americas has a broad membership of leading wireless operators and vendors promoting and facilitating the seamless deployment and widespread adoption of the 3rd Generation Partnership Project (“3GPP”) family of technologies, including LTE, 5G, and C-V2X, throughout the Americas.¹ Multiple 3GPP² standards covering C-V2X technology today enable vehicles to communicate with each other, with road infrastructure, and with pedestrians.

¹ 5G Americas Board of Governor members include AT&T, Cable & Wireless Communications, Ciena, Cisco, Crown Castle, Ericsson, Intel, Mavenir, Nokia, Qualcomm Incorporated, Samsung, Shaw Communications Inc., T-Mobile US, Inc., Telefónica, VMware and WOM.

² 3GPP unites seven telecommunications standard development organizations (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC), known as “Organizational Partners”, and provides their members with a stable environment to produce the reports and specifications that define 3GPP technologies. New features are ‘functionality frozen’ and are ready for implementation when a Release is completed.

And each subsequent 3GPP release continues improving the capabilities for C-V2X. As explained below, 5G Americas is very excited by the potential of C-V2X and encourages the FCC to promptly authorize such operations in the 5895 to 5925 MHz band.

INTRODUCTION AND SUMMARY

The Commission aptly notes in its 5.9 GHz *Notice* that C-V2X is gaining momentum both domestically and internationally.³ 5G Americas concurs with this assessment. Indeed, C-V2X for connected cars is one of the fastest growth areas in 5G use cases, and the fastest growth area in consumer IoT.⁴ The FCC also notes that the technology has improved to the point where automated driving is anticipated.⁵ While C-V2X was first implemented in 3GPP Release 14, and improved in Release 15. 3GPP's Release 16, which was finalized in July 2020,⁶ focuses on

³ See *Notice* at ¶¶ 5, 102. The Commission observes that Japan has authorized ITS spectrum in the 700 MHz band (for DSRC), and Europe has designated 5875-5905 MHz for ITS. However, many other countries, notably including China, have authorized C-V2X in portions of the 5.9 GHz band. See, e.g., 5GAA, *ITS Spectrum Utilization in the Asia Pacific Region* (2018) (referencing Australia, China, Japan, S. Korea, and Singapore). Moreover, at the recently concluded World Radiocommunication Conference, the International Telecommunication Union adopted a Recommendation recommending that countries harmonize spectrum regionally or globally for ITS, and that points to ITU-R Recommendation M.2121 that lists the 5.9 GHz band as a band for such harmonization. See WRC Recommendation COM4/1 (WRC-19), *Harmonization of Frequency Bands For Evolving Intelligent Transportation Systems Applications Under Mobile Service Allocations* (referring to ITU-R Recommendation M.2121, *Harmonization of Frequency Bands for Intelligent Transportation Systems in the Mobile Service* (2019)). That Recommendation recommends administrations to consider using the 5850-5925 MHz band or parts thereof for current and future ITS applications.

⁴ See 5G Americas, *5G – The Future of IoT* at §2.8.3 (July 2019) (“*The Future of 5G IoT*”), available at https://www.5gamericas.org/wp-content/uploads/2019/07/5G_Americas_White_Paper_on_5G_IOT_FINAL_7.16.pdf.

⁵ *Notice* at ¶ 5.

⁶ See e.g., 5G Americas, *3GPP Releases 16 & 17 & Beyond* (January 2021) available at <https://www.5gamericas.org/wp-content/uploads/2021/01/InDesign-3GPP-Rel-16-17-2021.pdf>; see also Bevin Fletcher, *3GPP Completes Latest 5G NR Spec With Release 16* FIERCE WIRELESS (July 6, 2020), available at <https://www.fiercewireless.com/5g/3gpp-completes-latest-5g-nr-spec-release-16>.

enabling autonomous vehicles (“AVs”).⁷ This use case will become the dominant mode of transportation in the future and C-V2X is poised to play an important enabling role for AVs.

5G Americas supports prompt Commission action to authorize C-V2X operations in the 5895 to 5925 MHz band as soon as possible⁸ and respectfully requests that the Commission modify its ITS rules to refer generally to the 3GPP Releases covering C-V2X, as opposed to cementing a specific 3GPP Release in the Commission’s ITS rules. This approach is necessary because future 3GPP Releases will continue to evolve the functionality of C-V2X for the 5.9 GHz band and any additional spectrum made available for C-V2X, and 5G Americas deems it appropriate that the updated ITS rules refer generally to 3GPP C-V2X standards. 5G Americas also requests that the FCC allocate at least 40 MHz of additional mid-band spectrum for advanced C-V2X capabilities – beyond the 30 MHz proposed in the FNPRM in the upper 5.9 GHz band – that will take advantage of 5G and future wireless technology generations.

While the FNPRM process to define C-V2X rules progresses over the coming months, the Commission should promptly issue a Public Notice⁹ detailing the requirements for the

⁷ See, e.g., 5G Americas, *The 5G Evolution: 3GPP Releases 16 – 17* at 5, §2.3 (January 2020), available at <https://www.5gamericas.org/wp-content/uploads/2020/01/5G-Evolution-3GPP-R16-R17-FINAL.pdf>

⁸ In its *Further Notice*, the Commission seeks comment on whether to continue to designate 5895-5905 MHz for DSRC or to allow C-V2X in that portion of the 5.9 GHz band. *Use of the 5.850-5.985 GHz Band*, First Report and Order, Further Notice of Proposed Rulemaking, and Order of Proposed Modification, 35 FCC Rcd. 13,440 ¶ 29 (2020) (“*FNPRM*” or “*Further Notice*”). 5G Americas supports allowing C-V2X in 5895-5905 MHz and corresponding rule changes to Part 90, Subpart M (for Roadside Units or RSUs) and Part 95, Subpart L (On-Board Units or OBUs) should reflect that use, as the Commission suggests in its 2019 *Notice. Use of the 5.850-5.985 GHz Band*, Notice of Proposed Rulemaking, 34 FCC Rcd. 12,603 ¶ 42 (2019) (“*NPRM*” or “*Notice*”).

⁹ *Notice* at ¶ 55.

streamlined waiver process to allow C-V2X deployments to get on the air in the 5895 to 5925 MHz band as soon as possible.

In addition, the FCC needs to ensure unlicensed out-of-band emissions from the new U-NII-4 band are set at a level of -27 dBm/MHz at the 5895 MHz edge – to match the level the FCC adopted for the 6 GHz U-NII-5 band for indoor and fixed outdoor operations. The FCC found this level appropriate for 6 GHz Low-Power Indoor (“LPI”) and fixed Standard Power outdoor unlicensed operations. The FCC should not allow portable unlicensed device to device (untethered to a fixed Access Point) or mobile hotspot connections in the U-NII-4 band as there is insufficient isolation to protect C-V2X on-board unit (“OBU”) receivers from unlicensed U-NII-4 devices operations inside of moving vehicles. The 5G Automotive Association has submitted detailed reports, interference simulations, and real-world interference testing demonstrating the deleterious impact on C-V2X operations in the 5895-5925 MHz band from unlicensed U-NII-4 and U-NII-5 equipment emitting -27 dBm/MHz OOB inside of vehicles. The Further Notice would allow much higher U-NII-4 OOB levels than -27 dBm/MHz and therefore portable and mobile U-NII-4 operations should be prohibited.

CONTINUED ADVANCES IN C-V2X CONNECTED CAR TECHNOLOGY

The Commission seeks comment on the state of C-V2X deployments and equipment availability.¹⁰ By 2023, worldwide shipments are expected to reach 76.3 million units with a five-year CAGR of 16.8 percent.¹¹ The connected car market size is projected to reach \$166

¹⁰ *Further Notice* at ¶¶ 148, 166.

¹¹ *See Connected Vehicle Shipments to Reach 76 Mln Units by 2023*, TELECOMPAPER (May 23, 2019), available at <https://www.telecompaper.com/news/connected-vehicle-shipments-to-reach-76-mln-units-by-2023--1294081>.

billion USD by 2025.¹² An increase in governmental interest in C-V2X, increasing demand for smartphone features in the car, and automated driving technologies along with passenger safety features are boosting the connected car market.¹³

Given the rapid uptake that is occurring as part of a global C-V2X ecosystem and the unfortunate lack of widespread Digital Short-Range Communications (“DSRC”) deployments in the U.S., 5G Americas believes a one-year transition of DSRC out of the band is more than ample.¹⁴ We support a more rapid transition and believe the Commission can and should finalize rules for C-V2X by the end of 2021 and require DSRC to cease operation and transition to C-V2X by mid-year 2022.

Moreover, 5G Americas supports the Commission’s proposal to issue streamlined waivers to road operators who wish to deploy C-V2X roadside units (“RSUs”) prior to the completion of the transition period. The FCC should also grant waivers to allow vehicle manufacturers to equip their vehicles with C-V2X OBUs. 5G Americas encourages prompt processing of all such waiver requests to allow for C-V2X RSU and OBU deployments in the 5895 to 5925 MHz band.

In addition to the tremendous safety benefits of C-V2X connected vehicles, they also promise to increase transportation options and reduce travel times. Once vehicular traffic returns to pre-COVID levels, traffic managers will be able to control the flow of traffic more easily with the advanced communications data available and prevent or lessen developing congestion. This

¹² *Connected Car Market Global Forecast to 2025*, MARKETS AND MARKETS (2019), available at <https://www.marketsandmarkets.com/Market-Reports/connected-car-market-102580117.html>.

¹³ *Id.*

¹⁴ *See Further Notice* at ¶ 147 (proposing a two-year transition period for ITS technology).

could have a significant impact on the environment by helping to cut fuel consumption and reduce emissions.

Additional spectrum beyond the 30 MHz allocation in the upper 5.9 GHz band is necessary to fully realize the benefits of C-V2X. It is therefore critically important that the FCC identify at least 40 MHz of additional mid-band spectrum that can be used for Advanced C-V2X applications. The advanced C-V2X applications that require spectrum beyond the proposed allocation include:

- Vehicle platooning – the ability of a group of vehicles traveling together to organize into a platoon, with a lead vehicle providing messages to other vehicles in the platoon allowing for smaller inter-vehicle distances and safe traveling.

- Extended sensors – to allow for exchange of sensor data and live video between vehicles, pedestrians, infrastructure units, and V2X application servers to extend each vehicle’s perception of the surrounding environment.

- Advanced autonomous or semi-autonomous driving – enabled by exchanging sensor data and driving intention to enable vehicles to coordinate their desired trajectories.

- Remote driving – to allow for a remote driver or V2X application to remotely drive a vehicle for passengers who cannot drive themselves, or vehicles driven in dangerous environments. This application requires ultra-low latency 5G connectivity.

Further enhancements and extensions to 5G NR sidelink communication will be introduced as part of Release 17 that is expected to be completed next year.¹⁵ These include enhanced sidelink communication for improved V2X and public safety use cases and operations scenarios and the extension of sidelink communication to new commercial use cases.

¹⁵ 3GPP anticipates the completion of Release 17 in 2022, with a freeze in March 2022, followed by coding protocols frozen and stable in June 2022. See Bevin Fletcher, *3GPP Sets New Timeline For Next 5G Specification, Release 17*, FIERCE WIRELESS (Dec. 16, 2020), available at <https://www.fiercewireless.com/5g/3gpp-sets-new-timeline-for-next-5g-specification-release-17#:~:text=Known%20as%20Release%2017%2C%20the,and%20stable%20in%20June%202022>.

The scope of the enhancements includes reduced device energy consumption during sidelink operation and enhanced reliability and reduced latency for sidelink communications supporting ultra-reliable low-latency communications (“URLLC”) applications. In parallel with the sidelink enhancements outlined above, 3GPP also is studying sidelink-based relaying, which uses device-to-device communication to extend the network coverage outside areas directly covered by network infrastructure. 3GPP will continue developing enhancements to support high-accuracy and low latency positioning in both horizontal and vertical domains to support improved C-V2X applications in dense urban environments.

TECHNICAL RULES FOR C-V2X AND U-NII-4 OPERATIONS

The Commission seeks comment on the technical rules to enable C-V2X operations in the 5.9 GHz band.¹⁶ As an association dedicated to promoting the 3GPP family of standards, 5G Americas certainly supports aligning the allowable power limits and other technical rules for C-V2X provided in relevant 3GPP standards, as was proposed by the 5G Automotive Association (“5GAA”) in its March 2020 Comments in this proceeding. The Commission correctly notes that C-V2X is a standards-based communications system that began with Release 14, and that additional standard work is underway developing 5G C-V2X. As noted above, 3GPP members in Releases 15 through 17 have added or are exploring new functionality for C-V2X. As the Commission is aware, 3GPP works on several Releases in parallel, starting future work well in advance of the completion of the current Release.

The Commission should adopt technical rules consistent with 3GPP physical layer standards. Because 5G Americas expects C-V2X technology to continue to evolve, it reiterates

¹⁶ See, e.g., *Further Notice* at ¶¶ 159-164.

here that the Commission should not codify any particular 3GPP Release into its revised Part 90 and Part 96 subparts.¹⁷ In addition, we support adopting the technical rules 5GAA proposes for the C-V2X service, including the in-band power limits and out-of-band emissions limits for RSUs and OBUs, which consistent with 3GPP physical layer standards.

No formal coordination procedure between FSS and C-V2X should be included in the Commission’s C-V2X rules. The Commission notes in the *Report and Order* that Fixed Satellite Services (“FSS”) share the 5.9 GHz band, but that their use is limited to uplinks from earth stations that are typically located on the coasts, to transmit to international inter-continental systems with geosynchronous satellites located over the Atlantic or Pacific Oceans, and hence, there is very low potential for harmful interference at the FSS satellite from C-V2X operations.¹⁸ 5G Americas agrees. Nonetheless, the Commission notes that ITS America and the Satellite Industry Association have stated that they developed a sharing protocol between DSRC and FSS operations.¹⁹ The Commission seeks comment on whether it should codify this sharing protocol for required C-V2X coordination procedures, or whether it is sufficient to leave coordination under the purview of the interested parties.²⁰ 5G Americas submits that no formal coordination procedure need be incorporated into the Commission’s rules, for the reasons the Commission states in its *Notice*. Given the limited number of FSS licensees, their largely coastal location for the inter-continental uplinks transmitting to satellites over the ocean, there is very low probability that C-V2X operations would create harmful interference to FSS operations in the band.

¹⁷ *See id.* at ¶ 162.

¹⁸ *Notice* at ¶ 50.

¹⁹ *Id.*

²⁰ *Id.*

Most importantly, in order to ensure the reliability of C-V2X communications, the FCC needs to ensure unlicensed out-of-band emissions (“OOBE”) from the new U-NII-4 unlicensed band do not interfere with C-V2X communications that support safe roads.

Specifically, the FCC should set OOBE levels from U-NII-4 operations to no greater than -27 dBm/MHz at the 5895 MHz edge – to match the level the FCC adopted for the 6 GHz U-NII-5 band for indoor and fixed outdoor operations. The FCC found this level appropriate for 6 GHz Low-Power Indoor (“LPI”) and fixed Standard Power outdoor unlicensed operations.

Furthermore, the FCC should not allow portable unlicensed device to device (untethered to a fixed Access Point) or mobile hotspot connections in the U-NII-4 band as there is insufficient isolation to protect C-V2X on-board unit (“OBU”) receivers from unlicensed U-NII-4 devices operations inside of moving vehicles. As the Commission knows, 5GAA has submitted detailed extensive reports, interference simulations, and real-world interference testing demonstrating the deleterious impact on C-V2X operations in the 5895-5925 MHz band from unlicensed U-NII-4 and U-NII-5 equipment emitting -27 dBm/MHz OOBE inside of vehicles. The Further Notice would allow much higher U-NII-4 OOBE levels than -27 dBm/MHz level the agency adopted for 6 GHz LPI and fixed outdoor operations. The OOBE levels should match the level adopted in the 6 GHz proceeding. And, portable and mobile U-NII-4 operations should be prohibited unless and until they be meet levels demonstrated to protect C-V2X OBU receivers.

CONCLUSION

5G Americas agrees with the Commission that authorizing use of C-V2X technology will ensure the rapid deployment of continually improving transportation and vehicular safety-related applications now and into the future.²¹ We further agree with the Commission that authorizing C-V2X in the 5.9 GHz band will achieve network effects necessary to maximize transportation and vehicular safety-related benefits; facilitate rapid development; enable improvements, learning, and upgrades; and be robust and secure.²² For all the above reasons, 5G Americas respectfully requests that the FCC authorize C-V2X operations in the 5.9 GHz band via final rules as soon as possible, and, in the meantime, permit C-V2X deployments on roadways and in vehicles pursuant to a streamlined waiver process.

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²¹ *Id.* at ¶ 24.

²² *Id.*