

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)
)
Request for Waiver of 5.9 GHz Band Rules to) ET Docket No. 19-138
Permit Initial Deployment of Cellular Vehicle-to-)
Everything Technology)

ORDER

Adopted: April 24, 2023

Released: April 24, 2023

By the Chiefs, Public Safety and Homeland Security Bureau, Office of Engineering and Technology, and Wireless Telecommunications Bureau:

I. INTRODUCTION

1. In this Order, the Public Safety and Homeland Security Bureau, the Office of Engineering and Technology, and the Wireless Telecommunications Bureau (collectively, the Bureaus) address the request (Joint Waiver Request) by Audi of America, Inc., Ford Motor Company, Jaguar Land Rover, the Utah Department of Transportation, the Virginia Department of Transportation, AAEON Technology Inc., Advantech Co., Ltd., Applied Information, Inc., Cohda Wireless Pty Ltd., Commsignia, Inc., Danlaw Inc., HARMAN International Industries, Inc., Kapsch TrafficCom USA Inc., and Panasonic Corporation of North America (collectively, the C-V2X Joint Waiver Parties) for a waiver of certain Commission rules applicable to intelligent transportation systems (ITS) operations in the upper 30 megahertz (5.895-5.925 GHz) portion of the 5.850-5.925 GHz Band (5.9 GHz band). The Joint Waiver Request seeks a waiver of the current Dedicated Short-Range Communication (DSRC) based rules to allow for the use of Cellular Vehicle-to-Everything (C-V2X) technology in the upper 30 megahertz of the 5.9 GHz band prior to adoption of final C-V2X-based rules. The C-V2X equipment subject to the Joint Waiver Request would operate in the 5905-5925 MHz portion of the 5.9 GHz band using a 20-megahertz channel.

2. Specifically, the C-V2X Joint Waiver Parties wish to “collectively deploy and facilitate deployment of [C-V2X] technology immediately”¹ pursuant to a waiver of 47 CFR § 2.106, NG160² to allow nationwide use of the upper frequencies of the 5.9 GHz Band for C-V2X-based ITS operations, conditioned on the technical parameters set forth in Appendix 1 of the Joint Waiver Request.³ They also

¹ Request for Waiver of 5.9 GHz Band Rules to Permit Initial Deployments of Cellular Vehicle-to-Everything Technology, Ford Motor Company, et al., ET Docket No. 19-138, at 1 (filed Dec. 13, 2021) (*Joint Waiver Request*), https://www.fcc.gov/ecfs/file/download/DOC-5f6d7d2ef3400000-A.pdf?file_name=C-V2X%20Waiver%20Request%2012%2013%202021.pdf. More recently, the parties submitted additional information on the request to the Commission. See Letter from the C-V2X Joint Waiver Parties to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-138 (filed Apr. 20, 2022) (*Joint Waiver Request Supplement*), <https://www.fcc.gov/ecfs/document/104201266008794/1>.

² “In the band 5895-5925 MHz, the use of the non-federal mobile service is limited to operations in the Intelligent Transportation Systems radio service.” 47 CFR § 2.106, NG160.

³ *Joint Waiver Request* Appendix 1 at 10-11; *Joint Waiver Request Supplement* at 3. The *Joint Waiver Request Supplement* did not change the technical parameters proposed in the *Joint Waiver Request*.

seek a waiver of certain part 90 and part 95 rules (47 CFR §§ 90.375, 90.377, 90.379, 95.3159,⁴ 95.3163, 95.3167, and 95.3189) governing the operation of roadside units (RSUs) and on-board units (OBUs)⁵ in the upper 30 megahertz of the 5.9 GHz band. For the reasons stated below, and subject to the technical parameters and conditions set forth herein, the Bureaus grant a waiver to the C-V2X Joint Waiver Parties to deploy C-V2X technology within the 5.895-5.925 GHz band.

II. BACKGROUND

3. On November 20, 2020, the Commission released the *5.9 GHz First Report and Order, Further Notice of Proposed Rulemaking, and Order of Proposed Modification*, which adopted new rules for the 5.9 GHz band.⁶ The Report and Order portion of the item (*5.9 GHz First R&O*) made spectrum available for unlicensed uses by designating the lower 45 megahertz of the band (5.850-5.895 GHz) for unlicensed operations while continuing to dedicate the upper 30 megahertz (5.895-5.925 GHz) for ITS operations.⁷ Additionally, the Commission ordered that ITS operations in the upper band transition from DSRC-based technology to C-V2X-based technology.⁸ The Commission noted that in the 20 years since it had adopted DSRC as the standard for ITS services in the 5.9 GHz band, DSRC-based technology had barely been deployed, and consequently, the spectrum had largely remained unused.⁹ It further noted that in the intervening years, several auto manufacturers and stakeholders in the consumer automobile market “have turned their attention to C-V2X, in part because of its use of cellular-based protocols and ability to enable rapid development and deployment of ITS applications.”¹⁰ As a result, the Commission determined that it must modernize its rules to allow for the deployment of C-V2X technology in the upper 30 megahertz of the 5.9 GHz band, positioning the United States to be a global leader at the forefront of continued C-V2X technology development.¹¹ In the Further Notice portion of the item (*5.9 GHz FNPRM*), the Commission sought comment on the timeline for the transition to C-V2X-based technology, as well as proposed rules for the technical and operational parameters of C-V2X, which would ultimately govern ITS operations in the band.¹² The Commission has not yet rendered a decision on the *5.9 GHz FNPRM*.

4. The *5.9 GHz First R&O* also stated that the Commission would permit existing or future part 90 ITS licensees to operate C-V2X-based roadside units in the 5.895-5.925 GHz band within their geographic licensing areas by obtaining a waiver of the Commission’s rules, subject to specific conditions, and directed the relevant bureaus to provide guidance to such waiver applicants on a

⁴ 47 CFR § 95.3159 is a reserved section and does not presently contain any regulatory information. Thus, we dismiss this aspect of the Joint Waiver Request as moot.

⁵ See 47 CFR §§ 90.375, 90.377, 90.379, 95.3163, 95.3167, and 95.3189. DSRC information is transmitted via roadside units that are licensed on the basis of non-exclusive geographic areas under part 90 (subpart M) of the Commission’s rules, 47 CFR §§ 90.370-395. Vehicular DSRC on-board units are authorized (i.e., licensed by rule) under part 95 (subpart L) of the Commission’s rules, 47 CFR §§ 95.3101-3189.

⁶ *Use of the 5.850-5.925 GHz Band*, ET Docket No. 19-138, First Report and Order, Further Notice of Proposed Rulemaking, and Order of Proposed Modification, 35 FCC Rcd 13440 (2020), *petitions for review denied sub nom. Intelligent Transp. Soc’y of America v. FCC*, 45 F.4th 406 (D.C. Cir. 2022) (*5.9 GHz First R&O*).

⁷ *Id.*

⁸ *Id.* at 13446.

⁹ See 35 FCC Rcd at 13441, para. 3.

¹⁰ *Id.* at 13441-42, para. 3.

¹¹ *Id.* at 13476, para. 102.

¹² *Id.* at 13501-08, and 1365, paras. 13, 58, 147, 151-168. The Commission also sought comment on a proposal to require all ITS operations in the 5.895-5.925 GHz band to either convert to C-V2X or cease operating two years after the effective date of a future rulemaking in this proceeding. See 35 FCC Rcd at 13500, para. 147.

streamlined waiver process for this purpose.¹³ However, nothing in the *5.9 GHz First R&O* purported to prevent parties from submitting a request for waiver pursuant to the Commission's existing waiver standard.¹⁴ The *5.9 GHz First R&O* further stated that manufacturers will need waivers to obtain equipment certification of C-V2X on-board units as well as a waiver to permit such device operation prior to the Commission adopting final rules for C-V2X-based on-board units.¹⁵ On August 6, 2021, the Wireless Telecommunications Bureau and Public Safety and Homeland Security Bureau issued a joint Public Notice providing guidance and additional guidelines for submitting a streamlined waiver requesting early deployment of C-V2X operations,¹⁶ and for the equipment certification process for C-V2X equipment.¹⁷

5. *Request for Waiver.* The C-V2X Joint Waiver Parties submitted a request for relief pursuant to section 1.925 to allow (1) certain automakers to deploy C-V2X-based OBUs in their cars sold in the United States; (2) the named state departments of transportation (state DOTs) to deploy C-V2X operations, including RSUs and OBUs, throughout the relevant state borders; and (3) identified equipment manufacturers to obtain the necessary equipment certifications for their C-V2X equipment.¹⁸ Specifically, the group of automakers (Audi, Ford, and Jaguar Land Rover) seek a waiver of certain rules that they contend will facilitate C-V2X use in their vehicle fleets nationwide as soon as possible by waiving rules related to C-V2X OBU operations.¹⁹ The state DOTs seek a waiver of certain rules to deploy C-V2X RSUs throughout their respective states under the FCC ITS licenses each currently holds,²⁰ to allow each of the identified automakers to deploy C-V2X-based OBUs in all their cars sold in the United States.²¹ The C-V2X Joint Waiver Parties request permission for nationwide C-V2X OBU operations.²² And the identified equipment manufacturers seek waiver, to the extent necessary, of certain rules limiting the upper 30 megahertz of the 5.9 GHz band to DSRC-based technology, to allow the identified equipment manufacturers to obtain the equipment certifications for their C-V2X equipment.²³

¹³ *5.9 GHz First R&O* at 13464-65, para. 55.

¹⁴ See *Guidance PN* at 2 (noting that waiver requests that do not satisfy the streamlined process “will be evaluated by the same Section 1.925 waiver standard in the general review process afforded to all licensees and applicants”).

¹⁵ *Id.* at 13465, para. 56.

¹⁶ See *Wireless Telecommunications Bureau and Public Safety and Homeland Security Bureau Provide Guidance for Waiver Process to Permit Intelligent Transportation System Licensees to Use C-V2X Technology in the 5.895-5.925 GHz Band*, Public Notice, DA 21-962 (WTB, PSHSB Aug. 6, 2021) (*Guidance PN*).

¹⁷ See *Guidance PN* at 2. Pursuant to the Commission's part 2 rules, certification of C-V2X-based equipment must be obtained prior to marketing, sale, or operation of this equipment for use under any waiver authorizing operation of C-V2X-based equipment. In addition to the licensing rules that require waiver to permit C-V2X operation, an equipment manufacturer (or other entity requesting certification of C-V2X equipment) will need a waiver to obtain equipment certification of C-V2X-based equipment (whether roadside units or on-board units) as well as a waiver to permit operation of such equipment prior to the Commission's adoption of final C-V2X rules. See generally 47 CFR §§ 2.901 *et seq.* (subpart J – Equipment Authorization Procedures). See also *Guidance PN* at 3.

¹⁸ *Joint Waiver Request* at 4-5. The C-V2X Joint Waiver Parties did not request streamlined treatment under the waiver process outlined in the *Guidance PN* and instead seek a waiver under the section 1.925 waiver standard. See *Joint Waiver Request* at 2, fn. 4, pp. 5-8.

¹⁹ *Joint Waiver Request Supplement* at 4.

²⁰ *Joint Waiver Request* at 4-5. Utah DOT holds FCC license WQCE200. Virginia DOT holds FCC license WQCU200.

²¹ *Joint Waiver Request* at 4-5.

²² *Joint Waiver Supplement* at 4.

²³ *Joint Waiver Supplement* at 5. This aspect of the waiver request does not require a waiver of the Commission's Part 2 rules governing equipment authorization. See generally 47 CFR §§ 2.901 *et seq.* (subpart J – Equipment Authorization Procedures).

The C-V2X Joint Waiver Parties request flexibility to deploy C-V2X technology based on LTE-based C-V2X technology, as well as 5G-based C-V2X technology.²⁴

6. In their request, the C-V2X Joint Waiver Parties ask the Commission to permit C-V2X-based operations that meet the technical parameters set forth in Appendix 1 of their filing on the upper 20-megahertz portion (5905-5925 MHz) of the 5.9 GHz band, pending adoption of final C-V2X-based rules.²⁵

III. DISCUSSION

A. Waiver Standard

7. The C-V2X Joint Waiver Parties are seeking a waiver pursuant to section 1.925 of the Commission's rules. Section 1.925 of the Commission's rules states that the agency may grant a waiver if it is shown that the underlying purpose of the rule at issue would not be served or would be frustrated by application to the instant case, and a grant would be in the public interest, or where, "in view of unique or unusual factual circumstances," application of the rule would be inequitable, unduly burdensome or contrary to the public interest, or the applicant has no reasonable alternative.²⁶ In addition, section 1.3 provides that the Commission may waive any provision of its rules on its own motion for good cause.²⁷

8. The C-V2X Joint Waiver Parties seek a waiver of 47 CFR §§ 90.375, 90.377, 90.379, 95.3163, 95.3167, and 95.3189, the rule sections that establish the technical requirements mandating DSRC-based technology in the upper 30 megahertz of the 5.9 GHz band,²⁸ to allow the use of C-V2X-based technology in the band and to provide adjustments to the technical parameters where the two technologies differ. As discussed below, we find that a waiver of these rules is warranted under section 1.925, subject to the C-V2X Joint Waiver Parties' commitment to adhere to the technical parameters in their petition as well as the additional conditions imposed by this Order which are intended to protect DSRC and federal incumbents from potentially harmful interference caused by C-V2X operations in the upper 30 megahertz of the 5.9 GHz band.²⁹ Regarding DSRC incumbents in particular, the C-V2X Joint Waiver Parties have shown that C-V2X waivers are unlikely to result in interference to DSRC operations given the extremely sparse deployment of DSRC equipment over the course of the last two decades, as

²⁴ *Joint Waiver Request Supplement* at 4, notes 15, 16.

²⁵ *Joint Waiver Request* Appendix 1 at 10-11; *Joint Waiver Request Supplement* at 3; C-V2X Joint Waiver Parties Aug. 29, 2022 Reply Comments at 11.

²⁶ 47 CFR § 1.925(b)(3)(i)-(ii).

²⁷ 47 CFR § 1.3 ("Any provision of the rules may be waived by the Commission on its own motion or on petition if good cause therefor is shown."); see also *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990).

²⁸ The part 90 rules provide for the licensing and registration of non-exclusive RSU licenses and licensing areas using DSRC frequencies; these rules list frequencies available to eligible applicants in the 5.9 GHz band for RSUs; set maximum EIRP and antenna height, and priority communications; and provide that DSRC RSUs operating in the upper 30 megahertz of the 5.9 GHz band must comply with the technical standard Institute of Electrical and Electronics Engineers (IEEE) 802.11p-2010. See 47 CFR §§ 90.375, 90.377, and 90.379. The part 95 rules provide that DSRC OBUs may operate in the upper 30 megahertz of the 5.9 GHz band; they establish the OBU transmit power limit (1.0 mW); and require that OBUs operating in the upper 30 megahertz of the 5.9 GHz band must also comply with (IEEE) 802.11p-2010. See *id.* §§ 95.3163, 95.3167, and 95.3189.

²⁹ "To facilitate granting of qualifying waiver requests, and in light of the alternate technical specifications proposed in their waiver, we would generally expect the ITS waiver applicant to include a demonstration showing that their requested waiver would not cause a greater potential for interference to other users operating in the 5.895-5.925 GHz band than DSRC-based operations in this band, and otherwise to address how the public interest would be served by such a waiver under Section 1.925. Based on the proposed change in technical parameters, the waiver request should also address any conditions (e.g., coordination zone radius, per 47 CFR § 90.371(b)) necessary to protect Federal Government Relocation Services." See *Guidance PN* at 2, n. 10.

the Commission itself has acknowledged.³⁰ We also agree with the C-V2X Joint Waiver Parties that the state Departments of Transportation, signatories to the Joint Waiver Request, are indeed best positioned to ensure that C-V2X RSUs do not interfere with existing DSRC operations since the state DOTs are the same entities that would have deployed DSRC RSUs in the first instance.³¹

9. The C-V2X Joint Waiver Parties also seek a waiver of 47 CFR § 2.106, NG160, but we find that such a waiver is unnecessary. Section 2.106 merely limits operations in the upper 30 megahertz of the 5.9 GHz band to ITS services.³² The Joint Waiver Request does not contemplate deploying non-ITS operations in the upper 30 megahertz of the 5.9 GHz band. Therefore, the request for a waiver of this provision is dismissed as moot.

10. We also find that, pursuant to section 1.925(b)(3)(i) of the Commission's rules, the underlying purpose of the Commission's rules governing ITS operations would not be served by denying the Joint Waiver Request and thereby delaying or precluding C-V2X operations in the upper 30 megahertz of the 5.9 GHz band.³³ In the *5.9 GHz First R&O*, the Commission expressly reserved 30 megahertz of spectrum in the 5.9 GHz band for "vital" ITS operations, using C-V2X technology after a transition period in lieu of the previously designated DSRC technology.³⁴ The C-V2X Joint Waiver Parties contend, and we agree, that granting the Joint Waiver Request serves the public interest by encouraging widespread deployment of ITS operations using V2X technology. To deny the Joint Waiver Request and insist on application of the current DSRC-based rules would be contrary to the public interest as it would further entrench the DSRC technology the Commission determined needs to be replaced and preclude rapid deployment of the technology the Commission has identified as best suited to promote the most efficient and effective use of the spectrum. The Commission expressly determined that the public interest dictates a transition to C-V2X technology as soon as possible, and stated its intent to permit early deployment through the waiver process, subject to specified conditions and limited to transportation and vehicle safety-related communications.³⁵ We therefore agree with the C-V2X Joint Waiver Parties that permitting C-V2X technologies to deploy now, prior to adoption of final C-V2X rules, will serve the public interest by advancing vehicular safety and promoting interoperability.³⁶ As the Commission stated in the *5.9 GHz First R&O*, "[t]o promote the most effective and efficient use of the upper 30 megahertz of spectrum in the 5.9 GHz band, [. . .] we [. . .] conclude that C-V2X technology provides the best means of achieving our goals for ITS in the coming years."³⁷ Allowing the deployment of the C-V2X technology at issue here also serves the public interest by allowing interested parties to invest all ITS resources towards

³⁰ See Joint Waiver Request Supplement at 4; see also 35 FCC Rcd at 13441, para. 3.

³¹ See Joint Waiver Request at 7.

³² "In the band 5895-5925 MHz, the use of the non-federal mobile service is limited to operations in the Intelligent Transportation Systems radio service." 47 CFR § 2.106, NG160.

³³ 47 CFR § 1.925(b)(3)(i).

³⁴ See *5.9 GHz First R&O* at 13441, para. 1.

³⁵ See *5.9 GHz First R&O* at 13446, para. 13 ("We further conclude that, to promote the most efficient and effective use of the spectrum that will continue to be designated for ITS, only a single technology is appropriate, and we will require use of C-V2X technology. Pending resolution of the transition of ITS operations to C-V2X, ITS licensees will be able to continue their DSRC-based operations, or, alternatively, to deploy C-V2X-based operations by obtaining a waiver subject to specified conditions.").

³⁶ See *5.9 GHz First R&O* at 13443 para. 8 ("C-V2X-based technology has gained momentum as a means of providing transportation and vehicle safety-related communications.") In discussing ITS operations using C-V2X technologies in the 5.9 GHz band, the Commission stated its view "that a single standard for ITS in this band is most likely to promote interoperability between vehicles and infrastructure in the United States, enable robust automotive safety communications, and accelerate the nationwide deployment of ITS applications while reducing implementation costs." See *id.* at 13480, para. 99.

³⁷ See *id.* at 13479, para. 95.

C-V2X technology, instead of using scarce resources to support outdated DSRC technology while they are simultaneously developing and deploying C-V2X devices.

11. With few exceptions,³⁸ commenters in the record overwhelmingly support granting the waiver. For example, the Alliance for Automotive Innovation opined that “expedited grant of the Waiver Request is necessary to ensure that lifesaving C-V2X technology is integrated into the vehicle models at the design stage.”³⁹ The Intelligent Transportation Society of America commented that expedited deployment of C-V2X technology will enable a more efficient transition from DSRC technology as required by the First Report and Order and FNPRM.⁴⁰ NCTA specifies that it does not oppose the C-V2X Joint Waiver Parties’ request provided the grant is conditioned on compliance with the conditions and technical parameters the C-V2X Joint Waiver Parties describe in their filing (i.e., in Appendix 1 of the *Joint Waiver Request*).⁴¹ We agree with NCTA in part, and as discussed in greater detail below, we condition this grant, among other conditions, on the C-V2X Joint Waiver Parties’ proposed technical specifications regarding frequency range, channel bandwidth, OBU transmitter output, out of band emission limits, and OBU/RSU EIRP limits, with an additional EIRP limit for CV2X OBUs at ± 5 degrees in elevation from the horizontal plane, as requested by the National Telecommunications and Information Administration (NTIA).⁴² NCTA further suggests that “if the Commission grants a waiver permitting vehicular and portable C-V2X operations at 33 dBm EIRP, as the parties request,” the Commission should state whether that power limit is consistent with NTIA analysis previously filed in the 5.9 GHz proceeding (which considered only 23 dBm EIRP C-V2X operations in vehicles), and provide details on why this is the case.⁴³ This analysis, NCTA contends, will be relevant as the Commission proceeds to adopt final rules for C-V2X.

12. Continental Automotive Systems (Continental), although supportive of the Commission’s efforts to promote and accelerate the deployment of C-V2X technology and not raising any concerns

³⁸ See Chris Lemire Jun. 15, 2022 Comments (objects that “[t]he new suggested 5.850 GHz - 5.925Ghz Band will interfere with and receive interference from the control links and video transmissions of Hobbyist /COT drones, RC Cars, and Security Camera systems.”); Ian Gresov Jun. 14, 2022 Comments (HAM operator and FPV Drone hobbyist requests that Commission not allow use of C-V2X in 5.9 GHz band since “the other frequencies that we use already experience heavy interference from Wi-Fi access points”); Richard Roy Jul. 28, 2022 Comments at 1 (objects to the request for failing to adhere to the waiver process prescribed by the FCC in its *Guidance PN* and for failing to describe why adhering to current FCC rules, specifically the technical parameters governing DSRC operations, would be “disadvantageous to C-V2X-based technology”); Richard Roy Oct. 11, 2022 Reply Comments at 2 (argues that the FCC should deny all C-V2X waiver requests to avoid “spending taxpayer dollars on an inferior technology with no future,” rescind the *5.9 GHz First R&O* mandating the cessation of DSRC operations in the 5.9 GHz band, and remove the *FNPRM* in docket 19-138 from any further consideration); and Shel Leader Aug. 28, 2022 Comments at 2 (objects that the proposed C-V2X-based rules are unnecessary and that the Commission should keep the DSRC-based protocols rather than “force a change to an unproven communication protocol.”)

³⁹ See, Alliance for Automotive Innovation Jul. 28, 2022 Comments at 5; see also National School Transportation Association Oct. 11, 2022 Comments at 2 (“NSTA believes that in order to support and promote continuous deployment of safety-critical communications systems, we need to lend our support to this Joint Waiver Request.”); NTSB Aug. 29, 2022 Comments at 4 (“Implementing [C-V2X] technology now is a critical step toward reducing the number of crashes and fatalities on our roadways.”)

⁴⁰ See Intelligent Transportation Society of America Jul. 28, 2022 Comments at 2.

⁴¹ NCTA Jul. 28, 2022 Comments at 2. NCTA – The Internet & Television Association is the principal trade association for the U.S. broadband and pay television industries. It represents more than 90% of the U.S. cable market, more than 200 cable networks, and equipment suppliers and providers of other services to the cable industry. See <https://www.ncta.com/about>. Some NCTA members provide Wi-Fi in the unlicensed 5.850-5.895 GHz (U-NII-4) and 5.925-6.425 GHz (U-NII-5) bands that are adjacent to the 5.895-5.925 GHz band. NCTA June 2, 2021 Comments, ET Docket No. 19-138, at 25-26.

⁴² See discussion at III.B. *infra*.

⁴³ *Id.*

relating to interference or other technical issues, objects that “grant of the requested waivers is premature until the Commission addresses unpredictable intellectual property licensing distortions caused by setting C-V2X as the de facto standard for all future connected vehicle communications.”⁴⁴ Continental requests that the Commission require licenses for C-V2X technology “to be available to all automotive industry participants subject to Commission regulations on [fair, reasonable, and non-discriminatory terms]”⁴⁵ as a condition to the grant of this waiver. Continental’s concern regarding patent issues has previously been raised in the docket for the 5.9 GHz rulemaking and the Commission sought comment in the Further Notice on the patent concerns raised by Continental.⁴⁶ The Commission may, if necessary, address the issues raised by Continental when adopting any final rules.⁴⁷ Until then, and to avoid prejudging Commission action on this matter, we condition this waiver on the outcome of any Commission action in the pending rulemaking proceeding, including any action addressing C-V2X patent licensing issues.

13. As a general matter, commenters that do not support the waiver request argue against the decision the Commission already made in the *5.9 GHz First R&O* to transition use of the upper 30 megahertz of the 5.9 GHz band to C-V2X-based technology.⁴⁸ However, the period to seek reconsideration of the Commission’s decision in this proceeding has passed and this is not the appropriate forum to raise objections to the Commission’s rules. Moreover, as discussed below, we believe that the record before us shows that the conditions we impose on C-V2X operations in this order will address any real world potential for harmful interference to incumbent operations.

14. After reviewing the record before us, we find that a waiver in this case will facilitate early C-V2X deployment as the Commission envisioned in the *5.9 GHz First R&O* and that the underlying purpose of the rules would be frustrated by their application here. Although we are conditioning the waiver grant on a requirement that grantees maintain the ability to conform to the final

⁴⁴ See Continental Automotive Systems Jul. 28, 2022 Comments at 2; see also Letter from Craig A. Gilley, Counsel to Continental, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-138, at 2 (filed Dec. 5, 2022) (reiterating and supporting arguments made in “Continental’s past filings”); European Association of Automotive Manufacturers (CLEPA) et al. Aug. 29, 2022 Joint Comments at 1 (objects that “patent rights for standardized technologies required under the Commission’s proposed regulation are not, as a practical matter, available to many industry participants.”); CLEPA et al. July 2, 2021 Joint Reply Comments at 1 (“Concerns raised by Continental and AT&T in their comments regarding the unavailability of licenses for CV2-X technologies are, unfortunately, well-founded.”).

⁴⁵ See Continental Automotive Systems Jul. 28, 2022 Comments at 6; see also Vortezon Jul. 27, 2022 Comments at 5 (supports the Joint Waiver Request contingent upon there being no prohibition on the eligibility of a new C-2VX entrant to apply for a license of C-2VX spectrum in the future once the Commission issues the final C-V2X rules).

⁴⁶ See *Further Notice*, 34 FCC Rcd at 13506, n.432.

⁴⁷ Contrary to Continental’s earlier comments in which it opined that its standard essential patent (SEP) licensing concerns could be remedied “by operation of a final rule or via waiver” (Continental Jul. 28, 2022 Comments at 6), Continental has more recently argued that the Commission must deal with the SEP licensing issues it has raised as part of the waiver process and not at a later stage “after products have already been deployed.” See Letter from Craig A. Gilley, Counsel for Continental Automotive Systems, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-138, at 4 (filed December 5, 2022). Continental argues that once products are deployed, “OEMs may have no choice but to bend to coercive injunctions [sic] demands, and thus will become locked into long-term licensing agreements on unfair and unreasonable terms . . .” *Id.* Continental’s arguments are highly speculative. We are not persuaded that they need to be addressed as part of or prior to our analysis of this waiver request.

⁴⁸ See Chris Lemire Jun. 15, 2022 Comments; Ian Gresov Jun. 14, 2022 Comments; Richard Roy Jul. 28, 2022 Comments at 1; Richard Roy Oct. 11, 2022 Reply Comments at 2; and Shel Leader Aug. 28, 2022 Comments at 2. Chris Lemire and Ian Gresov express concern about possible interference to their operations, but they fail to address the Joint Waiver Request, or the specific technical parameters proposed therein. Shel Leader completely ignores the Joint Waiver Request as well. As such, they provide no basis to deny the request. While Richard Roy does offer a critique of the Joint Waiver Request (i.e., that the technical parameters in Appendix 1 are not consistent with the current Part 90 and Part 95 technical rules for DSRC-based technology), his main objection and directive is that the Commission “rethink the rulemaking of November 2020.” Richard Roy Jul. 28, 2022 Comments at 5.

C-V2X operational, technical, and transition rules ultimately adopted by the Commission, we take this action without presuming any particular outcome of the pending rulemaking proceeding. Thus, in deploying pursuant to the waiver conditions set forth in this Order, the waiver proponents assume the risk associated with any such outcome. Based on the record before us, we grant a waiver to the C-V2X Joint Waiver Parties for the specified deployments, with conditions to protect incumbent licensees and interests.

15. We waive the Part 90 and 95 rule requirements that mandate DSRC technology in favor of C-V2X operation pursuant to the conditions articulated below. Specifically, we grant to the Virginia and Utah State Departments of Transportation waiver of 47 CFR §§ 90.375 (governing RSU license areas, communication zones and registrations) and 90.377 (RSU frequencies available, maximum power limit, antenna height, and priority communications). We grant to the Virginia and Utah State Departments of Transportation and the equipment manufacturers (AAEON Technology Inc., Advantech Co., Ltd., Applied Information, Inc., Cohda Wireless Pty Ltd., Commsignia, Inc., Danlaw Inc., HARMAN International Industries, Inc., Kapsch TrafficCom USA Inc., and Panasonic Corporation of North America) waiver of 47 CFR §§ 90.379 (governing Technical Standards for RSUs). And we grant to the Virginia and Utah State Departments of Transportation, the equipment manufacturers (AAEON Technology Inc., Advantech Co., Ltd., Applied Information, Inc., Cohda Wireless Pty Ltd., Commsignia, Inc., Danlaw Inc., HARMAN International Industries, Inc., Kapsch TrafficCom USA Inc., and Panasonic Corporation of North America), and the auto manufacturers (Audi of America, Inc., Ford Motor Company, and Jaguar Land Rover) waiver of 47 CFR §§ 95.3163 (providing that DSRC On-Board Units are permitted to operate in the upper 30 megahertz of the 5.9 GHz band), 95.3167 (maximum power limit for DSRC OBUs), and 95.3189 (technical standard for DSRC OBUs).

16. In waiving the DSRC-based technology requirement and the specific Part 90 and Part 95 technical rules identified above with respect to operation in the upper 30 megahertz of the 5.9 GHz band, we find that certain conditions are necessary to protect federal operations and incumbent DSRC systems in the band. We find that these technical restrictions are warranted to ensure that C-V2X systems deployed under this waiver are not inconsistent with the Commission's proposals and the spirit and intent that the Commission has envisioned for this spectrum. We also find that certain conditions are necessary to ensure that waiver recipients are on notice that they may need to adjust their C-V2X operations in a timely manner once the Commission adopts final rules applicable to their C-V2X operations pursuant to this waiver grant.

B. Waiver Grant Conditions

17. *Scope of the Waiver.* With respect to ITS licensees, this waiver is limited to those licensees that joined in the waiver request – i.e., the Virginia and Utah Departments of Transportation – to allow them to deploy C-V2X infrastructure that satisfies all conditions of this Order, including RSUs and OBUs, within their jurisdictions. The geographic area of the waiver is limited to the area encompassing the legal jurisdictions of Virginia and Utah. This condition will ensure that, as the waiver request indicates, the applicable ITS licensees can ensure that their operations will not jeopardize any DSRC operations in these areas.

18. All operations authorized pursuant to this waiver are limited to transportation and vehicle safety-related communications.

19. All C-V2X operations permitted pursuant to this waiver are limited to the 5905-5925 MHz frequencies using a 20-megahertz channel.

20. With respect to non-licensee automakers, this waiver is similarly limited to the named auto manufacturers requesting relief in the Joint Waiver Request.⁴⁹ This Order allows each of the named automakers to deploy C-V2X-based OBUs that satisfy all conditions herein in all of their vehicles

⁴⁹ The named auto manufacturers in the Joint Waiver Request are Audi of America, Inc., Ford Motor Company, and Jaguar Land Rover.

operating in the United States.

21. With respect to equipment manufacturers, this waiver is limited to those manufacturers of RSU and OBU equipment requesting relief in the C-V2X Joint Waiver Request.⁵⁰ This waiver order provides each of the named equipment manufacturers eligibility to obtain the necessary equipment certifications for their RSUs and OBUs. Equipment authorization requirements continue to apply to all RSUs and OBUs under this waiver order.⁵¹ Any application for equipment authorization will need to include a copy of this waiver order.

22. C-V2X operations under this waiver order are authorized on a secondary basis to the Federal radiolocation service operating on a primary basis within the 5.895-5.925 GHz band and must protect these Federal operations from harmful interference. The NTIA has reviewed the technical parameters proposed by the C-V2X Joint Waiver Parties in Appendix 1 to their petition and agrees that spectrum usage should be limited to 5905-5925 MHz and that EIRP for both OBUs and RSUs be limited to 33 dBm, as the C-V2X Joint Waiver Parties request.⁵² In addition, “to adequately protect the primary 5.9 GHz band for federal radiolocation services during this waiver period,” NTIA also requests that C-V2X OBUs be limited to an EIRP of 27 dBm at ± 5 degrees in elevation from the horizontal plane.⁵³ The C-V2X Joint Waiver Parties concur with this condition.⁵⁴

23. *Technical Requirements and Restrictions.* All RSUs and OBUs authorized under this Order must operate using the technical characteristics and operating parameters, including power, height, and out-of-band emission limits, specified below, in order to ensure compliance with all existing technical rules applicable to ITS operations other than the requirement to use DSRC-based technology:

C-V2X OBU and RSU Operations

Frequency Range	Channel Bandwidth	OBU Limits	RSU EIRP Limit
5905-5925 MHz	20 MHz	20 dBm Transmitter Output Power 33 dBm EIRP*; 27dBm EIRP within 5 degrees of horizontal	33 dBm EIRP

*EIRP (equivalent isotropically radiated power)

⁵⁰ The named equipment manufacturers in the Joint Waiver Request are: AAEON Technology Inc., Advantech Co., Ltd., Applied Information, Inc., Cohda Wireless Pty Ltd., Commsignia, Inc., Danlaw Inc., HARMAN International Industries, Inc., Kapsch TrafficCom USA Inc., and Panasonic Corporation of North America.

⁵¹ See generally 47 CFR §§ 2.901 *et seq.* (subpart J – Equipment Authorization Procedures) and 47 CFR § 2.905 (Marketing of radio frequency devices prior to equipment authorization).

⁵² See Letter from Charles Cooper, Associate Administrator, Office of Spectrum Management, National Telecommunications and Information Administration, to Ronald T. Repasi, Acting Chief, FCC Office of Engineering and Technology, ET Docket No. 19-138 (filed April 14, 2023) at 3. See also, *Joint Waiver Request* Appendix 1 at 10-11; *Joint Waiver Request Supplement* at 3; C-V2X Joint Waiver Parties Aug. 29, 2022 Reply Comments at 11.

⁵³ *Id.*

⁵⁴ See Letter from the C-V2X Joint Waiver Parties to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-138 (filed Apr. 20, 2023).

C-V2X Out-of-Band Emissions (OOBE) Limits

Frequency Offset (MHz from Channel Edge)	OOBE EIRP Limits for C-V2X Transmissions (dBm/100 kHz)**
0.0	-16.0
1.0	-22.0
10.0	-30.0
20.0	-40.0

**See IEEE 802.11p-2010 Table I.8

24. The state DOTs' C-V2X RSU operations must protect DSRC and primary non-federal fixed-satellite service (Earth-to-space) operations in the 5.895-5.925 GHz band from harmful interference. Prior to commencing C-V2X operations, the State DOTs must successfully coordinate with all DSRC incumbent(s) whose licensed areas either overlap or are within 25 miles of the license areas of the State DOTs. The purpose of this coordination is to ensure that harmful interference will not occur.⁵⁵ In addition, within 30 days of commencing operations, the State DOTs must file a report in the Universal Licensing System (ULS) confirming successful coordination (including the names of the DSRC incumbents and dates coordination was completed), or if applicable, certifying that coordination was unnecessary, and include a grandfathered list of state DOT RSU locations that will be converted from DSRC to C-V2X operation. FCC staff will add a C-V2X special condition to these RSU locations and forward the grandfathered state DOT RSU list to NTIA.

25. *RSU registration requirements.* Licensees must register each RSU in ULS before operating the RSU. RSUs included in the grandfathered DSRC RSU list being converted to C-V2X do not need to be filed in ULS. RSU registrations are subject to the requirements of 47 CFR § 1.923 as applicable (antenna structure registration, environmental review, international coordination, and quiet zones). Additionally, RSUs at locations subject to NTIA coordination⁵⁶ may not begin operation until the licensee receives NTIA approval. Registrations are not effective until the Commission posts them in ULS. It is the licensee's responsibility to delete from the registration database any RSUs that have been discontinued.⁵⁷

26. *Compliance with Final Rules.* We intend by this Order to enable a fast transition to the next generation of technology in this spectrum band while the Commission contemplates the framework for final rules. Consistent with this goal, we condition the waiver on the requirement that each waiver recipient will ensure that RSU and OBU operations and devices authorized under the waiver will comply with the final rules or other guidance provided by the Commission in any timeframe determined by the Commission. This approach ensures that waiver recipients, including but not limited to equipment manufacturers, will consider the pendency of the final rulemaking, and incorporate technology that will allow prompt and efficient regulatory compliance with respect to individual RSUs, OBUs, and C-V2X-based operations once any relevant final rules are implemented. Equipment manufacturers, in particular, must take steps to ensure that they can update or disable any OBUs deployed pursuant to this Order to bring these units into compliance with the final rules. Recipients of this waiver should be aware that the Commission may further tailor this and other waiver conditions, if needed and as appropriate, as part of any determination it makes in the rulemaking proceeding.

IV. ORDERING CLAUSES

27. Accordingly, IT IS ORDERED that, pursuant to section 4(i) of the Communications Act, as amended, 47 U.S.C. § 154(i), and section 1.925 of the Commission's rules, 47 CFR § 1.925, the

⁵⁵ Setting the coordination distance at 25 miles will ensure that C-V2X RSU operators are able to identify any neighboring DSRC incumbents.

⁵⁶ See 47 CFR § 90.371(b).

⁵⁷ See 47 CFR § 90.375(b).

request to waive the requirements of sections 90.375, 90.377, 90.379, 95.3163, 95.3167, and 95.3189 of the Commission's rules, 47 CFR §§ 90.375, 90.377, 90.379, 95.3163, 95.3167, and 95.3189, is HEREBY GRANTED subject to the conditions outlined in section III.B. above.

28. IT IS FURTHER ORDERED that the request to waive the requirements of 47 CFR § 2.106, NG160 and 47 CFR § 95.3159 is HEREBY DISMISSED as moot.

29. These actions are taken under delegated authority pursuant to sections 0.31, 0.131, 0.191, 0.241, 0.331 and 0.392 of the Commission's rules, 47 CFR §§ 0.31, 0.131, 0.191, 0.241, 0.331, and 0.392 and the *5.9 GHz First R&O*.⁵⁸

FEDERAL COMMUNICATIONS COMMISSION

Debra Jordan
Chief, Public Safety and Homeland Security Bureau

Ronald Repasi
Chief, Office of Engineering and Technology

Joel Taubenblatt
Chief, Wireless Telecommunications Bureau

⁵⁸ *5.9 GHz First R&O* at 13424-65, paras. 55-56.