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

NOTICE OF PROPOSED RULEMAKING

Adopted: December 12, 2019 **Released: December 17, 2019**

Comment Date: [30 days after date of publication in the Federal Register]
Reply Comment Date: [60 days after date of publication in the Federal Register]

By the Commission: Chairman Pai and Commissioners O'Rielly, Carr, Rosenworcel, and Starks issuing separate statements.

TABLE OF CONTENTS

I. INTRODUCTION

1. The 5.9 GHz band, once expected to support widespread deployment of systems that would improve efficiency and promote safety within the Nation's transportation infrastructure, has not lived up to its potential. The promise of ubiquitous vehicle-to-vehicle and vehicle-to-infrastructure communications in this band has never materialized, while vehicle manufacturers increasingly are using a multitude of other radio frequency based and other technologies to deliver tangible safety benefits.

2. To ensure that the American public realizes the maximum value from this 75 megahertz of mid-band spectrum,[1] we initiate this Notice of Proposed Rulemaking to assess the 5.9 GHz band rules and propose appropriate changes to ensure the spectrum supports its highest and best use. Recognizing the current state of vehicular technology and deployment and the evolution of the telecommunications market, our "fresh look" approach proposes to continue to dedicate spectrum—the upper 30 megahertz portion of the band—for transportation and vehicle safety purposes, while repurposing the remaining lower 45 megahertz part of the band for unlicensed operations to support high-throughput broadband applications.

II. BACKGROUND

3. For the past two decades, the 5.9 GHz band (5.850-5.925 GHz band) has been reserved for use by Dedicated Short Range Communications (DSRC), a service whose rules and protocols are designed to enable transportation and vehicle safety-related communications.[2] The original proposal to allow DSRC use of the band took note of the contemporaneous enactment of the Transportation Equity Act for the 21st Century, in which Congress directed the Commission to consider, in consultation with the Secretary of the Department of Transportation, spectrum needs for the operation of the Intelligent Transportation System (ITS), including spectrum for the dedicated short-range vehicle-to-wayside wireless standard.[3] When adopting licensing and service rules for DSRC operations in 2003, the Commission specified a single technological standard based on its expectation that, despite its general preference for leaving the selection of technologies to licensees, a single standard in this band was most likely to promote interoperability between vehicles and infrastructure in the United States, enable robust automotive safety communications, and accelerate the nationwide deployment of DSRC-based applications while reducing implementation costs.[4]

4. Since that time, the DSRC service has evolved slowly and has not been widely deployed within the consumer automobile market (it has found use in certain specialized, traffic-related projects). Meanwhile, numerous technologies that operate outside the 5.9 GHz band have been or are being developed and deployed to improve transportation safety and efficiency. The Commission also has made

[1] Mid-band spectrum generally refers to spectrum between 2.5 GHz and 24 GHz. Mid-band spectrum has become highly desirable as a key component for future 5G buildout given its balanced coverage and capacity characteristics. *See, e.g.,* The FCC's 5G FAST Plan (Sept. 28, 2018), https://www.fcc.gov/document/fccs-5g-fast-plan.

[2] *Amendment of Parts 2 and 90 of the Commission's Rules to Allocate the 5.850-5.925 GHz Band to the Mobile Service for Dedicated Short Range Communications of Intelligent Transportation Services*, ET Docket No. 98-95, Report and Order, 14 FCC Rcd 18221 (1999) (*DSRC Report and Order*). In addition to the primary non-Federal Mobile Service allocation for DSRC, the 5.9 GHz band is allocated for Federal Radiolocation Services and non-Federal Fixed Satellite (Earth-to-space) on a primary basis, and the Amateur Service on a secondary basis for non-Federal use in the U.S. Table of Frequency Allocations (U.S. Table). *See id.* at 18223-24, para. 6; 47 CFR § 2.106.

[3] *DSRC Report and Order*, 14 FCC Rcd at 18222-23, paras. 2-3; Transportation Equity Act for the 21st Century, Pub. L.105-178, § 5206(f), 112 Stat. 107 (1998) (TEA). The TEA did not require that the Commission allocate the 5.9 GHz band for ITS, only that the Commission consider doing so. ITS is a national program intended to improve the efficiency and safety of surface transportation systems. See Intermodal Surface Transportation Efficiency Act of 1991, Pub. L. No. 102-240, § 6051, 105 Stat. 1914 (1991). ITS applications rely on the integration of advanced vehicle safety communications technologies with highway infrastructure systems.

[4] *Amendment of the Commission's Rules Regarding Dedicated Short Range Communications Services in the 5.850-5.925 GHz Band (5.9 Band); Amendment of Parts 2 and 90 of the Commission's Rules to Allocate the 5.850-5.925 GHz Band to the Mobile Service for Dedicated Short Range Communications of Intelligent Transportation Services*, ET Docket No. 98-95, Report and Order, 19 FCC Rcd 2458, 2466-68, paras. 13-16 (2003) (*DSRC Service Rules Order*). *See also* 47 CFR §§ 90.379 and 95.3159 (incorporating by reference the American Society for Testing and Materials (ASTM) E2213-03 DSRC standard (the ASTM-DSRC Standard)). In 2010, IEEE adopted a new standard, 802.11p, for wireless access in vehicular environments. *See* https://standards.ieee.org/standard/802_11p-2010.html. Our rules continue to reference the ASTM-DSRC Standard.

more spectrum available for vehicular radars.[5] Long-range radar systems in the 76-81 GHz band are especially useful for automatic emergency braking systems and adaptive cruise control systems.[6] Additionally, safety and convenience features are increasingly being integrated into cellphone apps and connect to on-board displays through unlicensed spectrum protocols.[7] Optical cameras, sonar, and LiDAR (light detection and ranging) are commonly found in many of today's vehicles. It is clear that these new technologies have materially and significantly advanced overall automotive safety, generally surpassing many functions that were originally envisioned to be performed by DSRC (e.g., lane-keeping alerts, lane merge, etc.).[8]

5. Recently, a new technology, Cellular Vehicle to Everything (C-V2X), has been gaining momentum as a means of providing transportation and vehicle safety-related communications and has the support of many of the world's automotive interests.[9] As envisioned, C-V2X would build upon earlier efforts to develop ITS services as well as advancements in cellular technologies (e.g., cellular protocols such as 4G Long-Term Evolution or future 5G developments) as part of a connected vehicle ecosystem that provides direct communications between vehicles, between vehicles and infrastructure, between vehicles and other road users (collectively known as peer-to-peer communications), and between vehicles and cellular communications providers' mobile broadband networks.[10] Proponents of C-V2X anticipate that it will serve as the foundation for vehicles to communicate with a wide range of vehicles and infrastructure around them, providing non-line-of-sight awareness, provide their operators with notice of changing driving conditions with a high level of predictability for enhanced road safety, and engage in

[5] *See Amendment of Parts 1, 2, 15, 90 and 95 of the Commission's Rules to Permit Radar Services in the 76-81 GHz Band*, ET Docket No. 15-26, Report and Order, 32 FCC Rcd 8822 (2017) (increasing the amount of vehicular radar spectrum from one gigahertz to five gigahertz).

[6] Paul Pickering, The Radar Technology Behind Autonomous Vehicles, ECN (Dec. 7, 2017) https://www.ecnmag.com/article/2017/12/radar-technology-behind-autonomous-vehicles. *See also* Continental AG, Continental's Next Generation Radar Technology Enables New Safety Features (Aug. 19, 2019), https://www.continental.com/en-us/press-/press-releases/next-gen-short-range-radar-181454 (announcing a new 77 GHz short-range radar that offers improved performance over a prior 24 GHz model and describing radar sensors as "a fundamental tool for advanced driver assistance systems" that "enable more advanced features for the vehicle of the future").

[7] For example, the Waze driving app uses real-time data sourced by other drivers to deliver, among other things, updated accident and construction zone warnings. The app is now being integrated into vehicle display systems. Zac Estrada, Ford connects Waze through its infotainment system, The Verge (Jan. 10, 2018), https://www.theverge.com/2018/1/10/16874976/ford-waze-infotainment-ces-2018. A Valeo system being deployed on 2020 General Motors truck models allows drivers to "see through" objects in tow by integrating images wirelessly transmitted from a camera mounted on the back of a trailer into the in-cabin display. Brian Dorr, Invisible Tow-Behind: GMC Launches 'Transparent Trailer View,' Gear Junkie (Feb. 12, 2019), https://gearjunkie.com/gmc-transparent-trailer-view. Valeo, World premiere at CES 2019 of Valeo XtraVue Trailer, the invisible trailer system (Jan. 8, 2019), https://www.valeo.com/en/world-premiere-at-ces-2019-of-valeo-xtravue-trailer-the-invisible-trailer-system/.

[8] *See, e.g.*, *DSRC Service Rules Order*, 19 FCC Rcd at 2519-2520, Appx. C (listing many DSRC-based advanced vehicle safety systems—including road departure, lane merge, work zone warning, vehicle stopped or slowing, vehicle-to-vehicle collision avoidance—that appear to be available today using non-DSRC technologies).

[9] *See* Letter from Sean T. Conway, Counsel to the 5G Automotive Association (5GAA), to Marlene H. Dortch, Secretary, FCC, ET Docket No. 13-49 (filed Apr. 3, 2019) (5GAA Apr. 3, 2019 *Ex Parte*). C-V2X standards development began in 2015 when 3GPP specified C-V2X features based on the 4G LTE-Pro system in 3GPP Release 14.

[10] *Id.* at 7 n.28.

automated driving.[11] Notably, C-V2X uses a different technology standard that is incompatible with DSRC-based operations.[12]

6. Elsewhere within the 5 GHz band, unlicensed device use has developed exponentially to become a vital component of the communications landscape. In various proceedings over the past two decades,[13] the Commission established and expanded the spectrum available for Unlicensed National Information Infrastructure (U-NII) devices throughout the 5 GHz band.[14] As a result, most of the spectrum between 5.150 GHz to the lower edge of the 5.9 GHz band at 5.850 GHz is available for unlicensed operations.[15] In 2018, the Commission proposed to promote new opportunities for unlicensed use on a shared basis in portions of the frequency bands immediately above the 5.9 GHz band in the 6 GHz band (5.925-7.125 GHz).[16]

7. In 2013, recognizing that wireless broadband services were in high demand and that demand was expected to grow significantly in the future,[17] the Commission began a proceeding to

[11] *See* Qualcomm Connecting vehicles to everything with C-V2X at 2, https://www.qualcomm.com/invention/5g/cellular-v2x; Accelerating C-V2X commercialization at 15, https://www.qualcomm.com/media/documents/files/accelerating-c-v2x-commercialization.pdf; 5G NR based C-V2X, https://www.qualcomm.com/media/documents/files/5g-nr-based-c-v2x-presentation.pdf (all last visited Dec. 12, 2019); 5G Americas March 2018 White Paper, Cellular V2X Communications Towards 5G, at 3, https://www.5gamericas.org/white-papers/. Some of these functions would be supported by the evolution to 5G New Radio-based C-V2X. *Id.*

[12] C-V2X is based on the 3GPP LTE family of standards while DSRC is based on the IEEE 802.11 family of standards.

[13] *See Amendment of the Commission's Rules to Provide for Operation of Unlicensed NII Devices in the 5 GHz Frequency Range*, ET Docket No. 96-102, Report and Order, 12 FCC Rcd 1576 (1997) (*U-NII Report and Order*), Memorandum Opinion and Order, 13 FCC Rcd 14355 (1998) (establishing the 5.15-5.25 GHz (U-NII-1), the 5.25-5.35 GHz (U-NII-2A), and the 5.725-5.825 GHz (U-NII-3) bands); *Revision of Parts 2 and 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) devices in the 5 GHz Band*, ET Docket No. 03-122, Report and Order, 18 FCC Rcd 24484 (2003) (*U-NII-2C Report and Order*) (establishing the 5.47-5.725 GHz (U-NII-2C) band); *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, First Report and Order, 29 FCC Rcd 4127 (2014) (*U-NII 5 GHz Report and Order*) (adding 5.825-5.850 GHz to the 5.725-5.825 GHz (U-NII-3) band and deferring a decision on whether to allow unlicensed devices to use the 5.350-5.470 GHz U-NII-2B and 5.850-5.925 GHz U-NII-4 bands), *recon. denied*, Memorandum Opinion and Order, 31 FCC Rcd 2317 (2016). Where indicated below, certain relevant comments and other submissions in that docket (ET Docket No. 13-49) have been taken into consideration when formulating our proposals in this notice.

[14] U-NII devices are unlicensed devices that operate in the.5.15-5.35 GHz and 5.470-5.85 GHz frequency bands, use wideband digital modulation techniques, and "provide a wide array of high data rate mobile and fixed communications for individuals, businesses, and institutions." 47 CFR § 15.403(s). The U-NII rules are set forth in Part 15, Subpart E of our rules. Unlicensed devices do not operate pursuant to an allocation in the U.S. Table, 47 CFR § 2.106, and are instead governed by the conditions set forth in Part 15 of our rules.

[15] In 2013, when the Commission began to refer to the U-NII band segments by number to make it easier for the reader to follow U-NII discussions in the rulemaking docket and documents, it associated the term "U-NII-4" with the 5.850-5.925 GHz band. *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, Notice of Proposed Rulemaking, 28 FCC Rcd 1769, 1771 n.5 (2013) (*U-NII 5 GHz NPRM*).

[16] *See 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) (*6 GHz NPRM*) (proposing unlicensed use of 5.925-7.125 GHz (U-NII-5 to -8)).

[17] *U-NII 5 GHz NPRM*, 28 FCC Rcd at 1774, para. 15.

examine the potential for allowing U-NII devices to share the 5.9 GHz band with DSRC operations.[18] In 2016, building on previous efforts by the Commission, the Department of Transportation, and the automotive and communications industries to evaluate potential sharing solutions, the Commission developed a three-phase plan to test prototype unlicensed devices' ability to share the 5.9 GHz band with DSRC.[19] In October 2018, the Commission's Office of Engineering and Technology released and solicited comments on its Phase I test (FCC laboratory testing) report.[20] In response, commenters expressed support for various options—including continuing exclusive use for DSRC (and for conducting further testing),[21] promoting the use of C-V2X in the band,[22] or requesting that the band be made available for unlicensed operations with no further testing.[23] The Commission has worked with the Department of Transportation and the National Telecommunications and Information Administration (NTIA) in anticipation of Phase II and III testing.

8. On November 21, 2018, the 5G Automotive Association (5GAA), an association representing many of the world's major automotive, technology, and telecommunications companies, requested that the Commission waive the DSRC rules to allow deployment of C-V2X in the 20-megahertz channel located at the upper edge of the 5.9 GHz band (i.e., the 5.905-5.925 GHz portion of the band).[24] 5GAA contends that C-V2X represents a significant advancement in connected vehicle technology and would constitute an important first step toward leveraging 5G to increase road safety and to maximize the myriad other benefits of connected vehicles.[25] Those in support of the waiver assert that C-V2X is well-suited to making use of the 5.9 GHz band and in several ways, constitutes a preferable technology to

[18] *See U-NII 5 GHz NPRM*, 28 FCC Rcd at 1796-1800, paras. 88-101 (seeking comment on making an additional 195 megahertz of spectrum in the 5 GHz band available for unlicensed use, labelled U-NII-2B (the 5.4 GHz band from 5.350-5.470 GHz) and U-NII-4 (the 5.9 GHz band from 5.850-5.925 GHz).

[19] *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, Public Notice, 31 FCC Rcd 6130, 6130-31 and 6138-39 (2016). The test plan was devised to examine sharing between DSRC and unlicensed devices in the following phases: Phase I (FCC laboratory testing); Phase II (basic field tests with a few vehicles at a Department of Transportation facility); and Phase III (additional field tests with many vehicles, more test devices, and real-world scenarios). *Id.* at 6139.

[20] *Office of Engineering and Technology Requests Comment on Phase I Testing of Prototype U-NII-4 Devices*, ET Docket No. 13-49, Public Notice, 33 FCC Rcd 10766 (OET 2018). The test results showed that prototype unlicensed devices were able to detect a co-channel DSRC signal and implement post-detection steps designed to avoid interference from unlicensed devices to DSRC under laboratory conditions. *Id.* at 10767.

[21] *See, e.g.*, American Trucking Associations Comments, ET Docket No. 13-49, at 6 (filed Nov. 28, 2018) (stating "The 5.9 GHz DSRC spectrum remains the foundation of any successful deployment of vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), or vehicle-to-everything (V2X) communications systems because no other technology available today has the capability to provide the performance that freight vehicles demand"); *see also* Letter from Robert B. Kelly, Counsel to Intelligent Transportation Society of America, to Marlene H. Dortch, Secretary, FCC, ET Docket Nos. 19-138 and 13-49 and GN Docket No. 18-357, at 2 (filed Dec. 4, 2019).

[22] *See* 5GAA Reply, ET Docket No. 13-49, at 10 (filed Dec. 13, 2018) (stating "Given these developments, there ultimately may be a need to modify the current three-phase test plan").

[23] *See* NCTA Reply, ET Docket No. 13-49, at 14 (filed Dec. 13, 2018) (stating that "the 5.9 GHz band remains critical to the future of Wi-Fi"); Wi-Fi Alliance Comments, ET Docket 13-49, at 2 (filed Nov. 28, 2018) (stating that access to the 5.850-5.925 GHz band "can be particularly useful in meeting Wi-Fi spectrum needs"). "Wi-Fi" is a registered trademark of the Wi-Fi Alliance.

[24] *See* 5GAA Petition for Waiver, GN Docket No. 18-357, Appx. A (filed Nov. 21, 2018) (5GAA Waiver Request). 5GAA has more than 100 member companies including many of the world's major automotive, technology, and telecommunications companies.

[25] *See id.*

DSRC,[26] while those who oppose the 5GAA's proposal either express concern that it could threaten the viability of DSRC,[27] or that it could reduce the opportunity to make wider use of the 5 GHz band for unlicensed operations.[28]

III. DISCUSSION

9. In the 20 years since the Commission set aside the 5.9 GHz band for DSRC, transportation and vehicular safety-related technologies have evolved significantly, as have demands for access to mid-band spectrum. The state of DSRC deployment, the significant interest in C-V2X, and the demand for additional spectrum for unlicensed operations make this an opportune time to take a fresh look at the optimal use of this 75 megahertz of valuable spectrum that makes up the 5.9 GHz band.[29] The band plan we propose promises to transform the use of this spectrum to more fully and effectively serve the American people.

10. Our approach departs from our previous proposals that explored the possibility of permitting unlicensed devices to share spectrum with DSRC. Given the limited scope of DSRC deployment within the U.S. to date and the complexities that sharing entails, we are skeptical that delays to accommodate further testing are warranted—despite the fact that ongoing testing has shown promising results. To ensure that the American public can reap the utmost utility from the 5.9 GHz band with minimal further delay, we believe separate spectrum segments for unlicensed devices and ITS puts this band in the best position to serve the American public, obviating the need to study and implement complex spectrum sharing regimes. We seek comment on these proposals.

A. Dedicating Spectrum for Vehicular and Unlicensed Applications

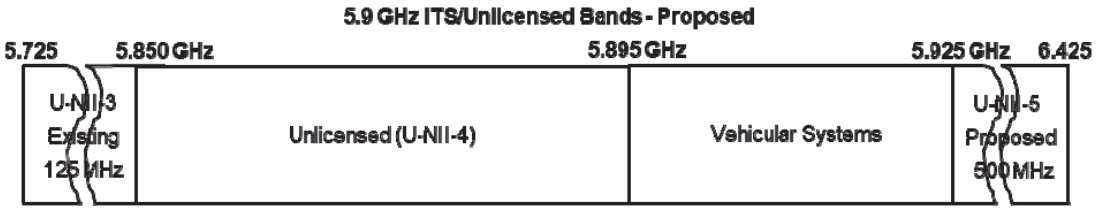
11. We propose to create sub-bands within the 5.9 GHz band to allow unlicensed operations to operate in the lower 45 megahertz of the band (5.850-5.895 GHz) and reserve the upper 30 megahertz of the band (5.895-5.925 GHz) for ITS. We seek comment on this proposal. As we discuss below, this 45/30 megahertz split for unlicensed devices and ITS applications is intended to optimize the use of spectrum resources in the 5.9 GHz band by enabling valuable additions and enhancements to the unlicensed ecosystem and by continuing to dedicate sufficient spectrum to meet current and future ITS needs within the vehicular-related ecosystem. This proposal seeks to provide the spectrum necessary for unlicensed operations to implement the widest, highest throughput channel permitted by industry-developed standards for U-NII devices, while clarifying the technical rules and eliminating uncertainty for the development and deployment of ITS applications.

[26] *See*, *e.g.*, Nokia Comments, GN Docket No. 18-357 (Feb. 8, 2019); T-Mobile Comments, GN Docket No. 18-357 (Jan 29, 2019); Ericsson Comments, GN Docket No. 18-357 (Jan. 18, 2019).

[27] *See, e.g.,* NXP USA, Inc. Comments, GN Docket No. 18-357, at ii (Jan. 29, 2019); APTIV Comments, GN Docket No. 18-357, at 2-3 (Jan. 11, 2019); Toyota Reply, GN Docket No. 18-357, at 10 (Feb. 26, 2019).

[28] *See, e.g.*, Wi-Fi Alliance Comments, GN Docket No. 18-357, at 2 (Feb. 8, 2019); NCTA Comments, GN Docket No. 18-357 at 6, 9.(Feb. 8, 2019) *See generally* Monica Alleven, "Qualcomm, Nokia, Samsung Clash with Wi-Fi Alliance over 5.9 GHz for C-V2X," (Feb. 11, 2019) https://www.fiercewireless.com/wireless/qualcomm-nokia-samsung-clash-wi-fi-over-5-9-ghz-for-c-v2x (discussing various parties' responses to the 5GAA Petition for Waiver). We do not address the waiver request in this new proceeding.

[29] *See, e.g.*, Letter from Rick Chessen, NCTA, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 13-49, at 6 (filed Oct. 16, 2018) (NCTA Oct. 16, 2018 *Ex Parte*) (suggesting that the Commission take a "fresh, holistic" look at the 5.9 GHz band).



12. We note one benefit of our proposal to provide specified sub-bands in which unlicensed operations and vehicular-related systems separately operate is that we no longer would need to expend time and resources to resolve difficult questions about co-existence and sharing of unlicensed operations with DSRC. Recognizing the time and effort that would be required to complete Phases II and III of the existing test plan, we do not see the benefit in further retarding deployment of important automotive safety applications or delaying the introduction of unlicensed devices while we await resolution of this issue. We nevertheless realize that results of the coexistence testing to date have been promising and, as appropriate, would welcome further studies into compatibility between unlicensed devices and ITS applications. It remains our policy to encourage exploration of more efficient spectrum use and promote compatibility among different users. Commenters are invited to weigh this and any other benefits arising from our proposal.

1. 5.850-5.895 GHz – 45 Megahertz for Unlicensed Operations

13. The U-NII bands span much of the 5 GHz band and play a crucial role in accommodating the needs of businesses and consumers for fixed and mobile broadband communications and represent a core component of today's unlicensed ecosystem. These bands support Wi-Fi devices such as routers and their associated connected devices to provide high data rate local area network connections for smart phones, tablets, computers, television and other devices inside and outside the home to interconnect with and access the Internet. Wi-Fi also enables data offloading from commercial wireless networks to relieve congestion when consumer demand is high.

14. Today, the demand for spectrum to support unlicensed use has only intensified. Industry studies project that the U.S. will need between 788 megahertz and 1.6 gigahertz of new mid-band spectrum by 2025 to accommodate the growing demand for Wi-Fi.[30] Wi-Fi has become a staple in American life, and many households rely on Wi-Fi to connect to the Internet. The latest Wi-Fi standards, IEEE 802.11ac and the next-generation 802.11ax (marketed as "Wi-Fi 6"), promise gigabit speeds, superior performance in crowded environments, and better device battery life.[31] Wi-Fi 6 is flexible—permitting operation using a variety of bandwidths in the 5 GHz band—but requiring wide-bandwidth 160-megahertz channels to deliver the most capacity and advanced features.[32]

15. The 5.9 GHz band can provide additional spectrum to support increased demand through mobile data offloading. Data offloading allows licensed mobile operators to use other available resources, including unlicensed devices (whether through home Wi-Fi and commercial hotspots or

[30] *See* NCTA Oct. 16, 2018 *Ex Parte* at 2 n.2 and n.3 (citing two studies (i) Steve Methley & William Webb, Quotient Assocs. Ltd., *Wi-Fi Spectrum Needs Study* 26, 28 (Feb. 2017) noting that "the study makes a range of predictions; the numbers cited assume that only 30% of the unlicensed spectrum that is burdened by Dynamic Frequency Selection rules is utilized by 2025"), and (ii) Rolf de Vegt et al., Qualcomm Techs., Inc., *A Quantification of 5 GHz Unlicensed Band Spectrum Needs* at 5 (2017)).

[31] *See* Letter from Danielle J. Piñeres, NCTA, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 13-49, at 2 (filed Sept. 25, 2019) (citing Vijay Nagarajan, 160 MHz Channels: The Wi-Fi 6 Superhighway, Broadcom (Aug. 23, 2019), https://www.broadcom.com/blog/160-mhz-channels-wi-fi-6-superhighway) (NCTA Sept. 25, 2019 *Ex Parte*).

[32] *See* IEEE, 802.11ac-2013 - IEEE Standard for Information technology (Dec. 18, 2013), https://ieeexplore.ieee.org/document/6687187 and IEEE, P802.11ax/D4.0, Feb. 2019 - IEEE Draft Standard for Information Technology (Mar. 12, 2019), https://ieeexplore.ieee.org/document/8672643.

carrier-deployed LTE-U equipment) to seamlessly deliver substantial amounts of data to end users' mobile devices rather than using the carriers' commercial wireless frequencies.[33] Offloading reduces the amount of data flowing through a carrier's network, which reduces the potential for network congestion by freeing bandwidth (especially in indoor environments) resulting in increased performance for all users. As 5G deployments allow for the transmission of large amounts of data from new connected consumer and commercial devices, the demand for offloading is expected to rise significantly.[34] Unlicensed use of the 5.9 GHz band appears to be well suited to meet this need.

16. The 5.850-5.895 GHz sub-band in the 5.9 GHz band is now especially well positioned to deliver immediate and potentially significant benefits when used by unlicensed devices and can help the Commission find new ways to meet the continued demand for spectrum access. Our proposal to add 45 megahertz of 5.9 GHz spectrum that can be combined with the adjacent U-NII-3 band (5.725-5.850 GHz), if adopted, would provide a large contiguous block of unlicensed spectrum that could accommodate a variety of options—including two 80-megahertz Wi-Fi channels, four 40-megahertz Wi-Fi channels, or a single contiguous 160-megahertz Wi-Fi channel.[35] Further, because the 5.850-5.895 GHz sub-band is adjacent to the U-NII-3 band which supports unlicensed operations, equipment manufacturers should be able to readily and cost-effectively manufacture devices to expand operations into this sub-band.[36] We seek comment on how easily existing U-NII equipment could be modified to take advantage of the additional 45-megahertz we propose here.

17. We note that expanding unlicensed operations into the lower 45-megahertz portion of the 5.9 GHz band could, in combination with the adjacent U-NII-3 band, also enable the first contiguous 160 megahertz channel for U-NII devices that would not require use of dynamic frequency selection (DFS) interference mitigation technologies.[37] Thus, we expect that equipment developed for the 5.850-5.895 MHz band would be available sooner and provide users with superior performance as the equipment would not be subject to delays associated with development of complex test procedures to verify DFS operation, nor would it be subject to variations in available bandwidth due to the DFS triggering (which would affect throughput and reduce the amount of available spectrum at any given time).[38] In proposing to make a 160 megahertz channel available for use without dynamic frequency

[33] *See, e.g.,* Monica Paolini, Senza Fili, LTE unlicensed and Wi-Fi: Moving beyond coexistence (2015) (also filed in ET Docket No. 15-105 on June 3, 2015). *See also* The Fast Mode, What is Wi-Fi Offload?, https://www.thefastmode.com/what-is-wi-fi-offload.

[34] *See* Kristen Beckman, Wireless Infrastructure Association, Addressing the 5G Paradox: Indoor Offload Options for Skyrocketing Data Traffic (2019), https://wia.org/blog/addressing-the-5g-paradox-indoor-offload-options-for-skyrocketing-data-traffic/.

[35] *See* Appx. A, Figure 2.

[36] Wi-Fi Alliance Comments, ET Docket 13-49, at 2 ("because the U-NII-4 band is adjacent to other bands already used by unlicensed technologies like Wi-Fi, the same equipment will be able to take advantage of additional capacity and offer higher speeds using wider bandwidths"). *See also* Letter from Stephen E. Coran, Counsel to the Wireless Internet Service Providers Association, to Marlene H. Dortch, Secretary, FCC, ET Docket 13-49, at 2 (filed Feb. 28, 2019) (discussing how the 5.9 GHz band is useful not just for Wi-Fi but for rural broadband under rules that are similar to those used in the adjacent 5 GHz U-NII band).

[37] 47 CFR § 90.407(h)(2). The current U-NII band plan and technical rules in the 5 GHz band does not make such a 160-megahertz channel possible. Although 200 megahertz of contiguous spectrum spans the U-NII-1 and U-NII-2A bands, the U-NII-2A band is subject to dynamic frequency selection requirements while the U-NII-1 band is not. Likewise, the U-NII-2C band (5.470-5.725 GHz) is subject to dynamic frequency selection requirements.

[38] Developing a dynamic frequency selection requirement can be a time-consuming endeavor that delays the introduction of equipment that could use the band, results in more complex and costly equipment, and could cause network-acquisition delays and service interruptions that could reduce the utility of the band for broadband access. *See, e.g.*, NCTA Comments, ET Docket No. 13-49, at 20-21 (filed May 28, 2013).

selection, we seek to maintain the U.S.'s role as an innovator and global spectrum policy leader. We request comment on our proposal to make 45 megahertz of spectrum available for unlicensed operations.

2. 5.895-5.925 GHz – 30 Megahertz for ITS

18. Promoting traffic safety and other ITS benefits remains a critical priority of the United States, and we support the development and widespread use of these technologies and services—whether in the 5.9 GHz band or elsewhere—that can meaningfully promote the public interest.[39] Although the Commission had high expectations,[40] DSRC has not lived up to its promise of achieving the ITS goals, leaving valuable mid-band spectrum largely fallow. In the 20 years since the Commission designated the 5.9 GHz band for DSRC use, the band has seen limited deployment,[41] and much of it appears to be associated with grants for demonstration projects that have been designed to address particular traffic and safety concerns.[42] Use of the entire 5.9 GHz band for DSRC never became ubiquitous as was anticipated when this spectrum was first designated. As we proceed, we seek comment on the state of DSRC-based deployment and the extent to which existing licensees currently operate on some or all of the existing channels in the 5.9 GHz band.

19. Today's technological environment is vastly different from 1999 when we first allocated the 5.9 GHz band for ITS. We continue to recognize the importance of ITS, and are committed to a regime that enables the provision of ITS—including both transportation and vehicular safety-related communications—in the 5.9 GHz band. With this Notice we revisit how best to make use of the 5.9 GHz band as part of a larger ecosystem that includes a variety of spectrum resources including spectrum outside of the 5.9 GHz band that can improve and enhance delivery of these services today and into the future. We recognize that several ITS-related functions are well suited for the 5.9 GHz band—such as non-line-of-sight applications and certain vehicle-to-infrastructure applications—and can be an important part of securing improved transportation and vehicular safety-related applications in the coming years. We seek comment on the transportation and vehicular-safety related applications that are particularly suited for the 5.9 GHz band as compared to other spectrum bands, and how various bands can be used efficiently and effectively to provide these applications.

20. We propose to dedicate 30 megahertz of spectrum in the upper portion of the 5.9 GHz band at 5.895-5.925 GHz to support ITS operations in this band and seek comment on this proposal. We continue to believe that this band will be of utility for transportation and vehicular safety technology as part of a larger transportation and vehicular safety-related ecosystem that also includes spectrum outside of the 5.9 GHz band. In re-examining the best use of the 5.9 GHz band, we seek to ensure the most

---

[39] One important vehicular safety-related goal is to reduce traffic injuries and fatalities. *See, e.g.*, Letter from Steven H. Bayliss, Vice President Public Policy and Regulatory Affairs, Intelligent Transportation Society of America, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 13-49, at 3 (filed Nov. 28, 2018); 5GAA Apr. 3, 2019 *Ex Parte* at 2 & n.3.

[40] *See DSRC Report and Order*, 14 FCC Rcd at 18221, para. 1 (stating that "ITS services are expected to improve traveler safety, decrease traffic congestion, facilitate the reduction of air pollution, and help conserve vital fossil fuels.").

[41] The Commission's Universal Licensing System (visited Nov. 5, 2019) shows 107 active DSRC roadside unit licenses. These geographic licenses authorize roadside unit operations by various cities, counties, states and private entities in areas across the country. We note that multiple roadside units can be registered under each license. A May 2019 U.S. Department of Transportation report indicates that at that time there were 57 active projects (with 6,182 infrastructure units and 15,506 in-vehicle units) and 40 planned projects (with 1,916 infrastructure units and 3,371 in-vehicle devices). *See* https://www.transportation.gov/research-and-technology/operational-connected-vehicle-deployments-us (last visited Dec. 4, 2019).

[42] As part of its Connected Vehicle Pilot Deployment Program, the Department of Transportation awarded funding in September 2015 for three pilot sites in New York City, Wyoming, and Tampa to implement a suite of V2I, V2V, and V2P applications in selected areas (e.g., in city intersections and along state highways).

efficient and effective use of this valuable spectrum resource and believe that ITS users can be accommodated in a significantly smaller spectrum space considering the recent and anticipated future technological developments relating to transportation and vehicular safety-related applications. In support of its waiver request, 5GAA submitted studies of using 10- and 20-megahertz-wide channels for C-V2X that found that allowing operation on a single 20-megahertz channel will support the introduction of services "that [will] enable many important safety applications, such as red light warnings, basic safety messages, emergency alerts, and others, to enhance traffic systems and operations."[43]

21. We recognize that 5GAA advocates for additional 5.9 GHz spectrum to support the delivery of 5G C-V2X applications that will enable "advanced features" and note that 5GAA also states that "the applications for 5G C-V2X likely will expand in ways that are difficult to predict."[44] We anticipate that in the future, important vehicular-related applications can and will be accomplished by using a combination of both licensed and unlicensed devices and technologies and will not be limited to ITS operations in the 5.9 GHz band. Internationally, several countries have provided for ITS applications in spectrum blocks that are similarly sized to or even smaller than what we are proposing. For example, Japan has a dedicated a single 10-megahertz channel for DSRC called "ITS Connect" at 760 MHz that is successfully and actively used for collision avoidance around intersections.[45] Europe has provided a harmonized 30-megahertz channel (5.875-5.905 GHz) for ITS-based applications.[46] We propose that designating 30 megahertz of spectrum will be sufficient to support ITS-related functions in the 5.9 GHz band, which will be a part of a larger wireless ecosystem enabling systems that advance national transportation and vehicular safety-related goals.[47] We seek comment on this proposal.

22. Further, our proposal—which retains a specific spectrum designation for transportation and vehicular safety-related systems while clarifying the ITS technologies permitted to use this spectrum—would provide much-needed certainty for users and would remove the regulatory uncertainty that many parties have identified as an impediment to the roll-out of advanced vehicular technologies at 5.9 GHz. For example, the Alliance of Automobile Manufactures asserts that "repeated spectrum sharing proposals by the FCC have induced ongoing uncertainty within the 5.9 GHz band" and that "[a]s a result of continued lack of clarity about unlicensed spectrum sharing in the 5.9 GHz band, planned deployments of V2X technologies have been halted, and the future of the 5.9 GHz band for ITS applications remains unpredictable."[48] Toyota, a supporter of DSRC, which earlier had announced deployment of DSRC

[43] 5GAA Waiver Request at 21-22; *see also* Letter from Sean T. Conway, Counsel to 5G Automotive Association, to Marlene H. Dortch, Secretary, FCC, ET Docket 13-49, GN Docket No. 18-357, at 1 (filed July 8, 2019) (5GAA July 8, 2019 *Ex Parte*) (stating that 20 megahertz is the "ideal channel size" for LTE C-V2X).

[44] 5GAA Apr. 3, 2019 *Ex Parte* at 9.

[45] U.S. Department of Transportation, Status of the Dedicated Short Range Communication Technology and Applications Report to Congress (July 2015) (noting that Japanese automotive manufacturers (mainly Toyota) are actively supporting the deployment of V2X using 760 MHz communication).

[46] *See* "2008/671/EC: Commission Decision of 5 August 2008 on the harmonised use of radio spectrum in the 5875-5905 MHz frequency band for safety-related applications of Intelligent Transport Systems (ITS) (notified under document number C(2008) 4145)," Document 32008D0671 (2008), https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32008D0671. *See also* European Conference of Postal and Telecommunications Administrations, CEPT Report 71 at 7 (2019) https://www.ecodocdb.dk/download/19a361a9-d547/CEPTRep071.pdf (stating that "[t]here is no evidence that spectrum availability is currently a constraint on the development of ITS," as part of an examination of possible expansion of ITS frequencies to support both automotive and rail applications).

[47] We seek comment in Section III.D. below on the extent to which the needs for transportation and vehicular safety-related communications and other ITS applications originally identified for the 5.9 GHz band are already being met through spectrum use outside of the 5.9 GHz band.

[48] *See* Letter from David Schwietert, Interim President and CEO, Alliance of Automobile Manufacturers, to Marlene H. Dortch, Secretary, FCC, ET Docket 13-49, GN Docket No. 18-357, at 2-3 (filed June 12, 2019). *See also* Motor

(continued….)

systems on vehicles sold in the U.S. starting in 2021 with the goal of having it deployed across most of its automotive lineup by mid-decade, recently announced that it will pause deployment to re-evaluate the regulatory environment.[49] Similarly, the Transportation Research Board points to research from the National Academies of Sciences, Engineering, and Medicine that agrees with the statement that "proposed spectrum sharing in the 5.9 GHz band is the most serious risk and uncertainty" for connected vehicle system deployment.[50]

23. We believe that a 30-megahertz designation would meet the needs of future ITS deployment while providing for the most efficient use of this valuable spectrum. We note that a primary purpose of the original DSRC band was to provide valuable vehicular safety of life applications to the public. With this Notice, we propose that ITS in this band continue to provide safety of life services. We seek comment on this proposal. Additionally, we seek comment on whether there are actions that we should take, or requirements that we should adopt, to promote rapid and effective deployment of ITS (e.g., establishing appropriate benchmarks for infrastructure deployment or in-vehicle equipment installation).[51]

24. *C-V2X in the 5.905-5.925 GHz band.* Specifically, we propose to authorize C-V2X operations in the upper 20 megahertz of the band (5.905-5.925 GHz). We seek specific and detailed comment on this proposal that can fully inform our decision. As noted above, in its waiver request 5GAA specifically requested that the Commission allow deployment of C-V2X in this particular 20-megahertz spectrum segment.[52] In proposing to maintain the allocation of this spectrum for ITS through use of C-V2X we seek to authorize use of technology most capable of ensuring the rapid development and deployment and of continually improving transportation and vehicular safety-related applications now and into the future. Among other things, we believe that this technology should achieve network effects necessary to maximize transportation and vehicular safety-related benefits; facilitate rapid development and deployment; enable improvements, learning, and upgrades; and be robust and secure. ITS technology should also be spectrally efficient and be able to integrate spectrum resources from other bands as part of its transportation and vehicular safety-related system. We believe that authorizing C-V2X in at least 20 megahertz of the 5.9 GHz band would ensure that we achieve these goals and seek comment on this view. We seek comment on this proposal.

25. Many of the U.S. and world motor vehicle manufacturers and industry, and the communications industry critical to ensuring the rapid and successful development and deployment of ITS, have urged the Commission to authorize C-V2X to operate in the 5.9 GHz band.[53] 5GAA explains

(Continued from previous page)
& Equipment Manufacturers Association Comments, ET Docket 13-49, at 3 (filed Nov. 28, 2018) (stating that "[w]hile the industry is ready and poised for greater deployment, regulatory uncertainty … is hindering decision-making by vehicle manufacturers to push forward and deploy V2V DSRC in their products."); Letter from Scott Delacourt, Counsel to Safety Spectrum Coalition, to Marlene H. Dortch, Secretary, FCC, ET Docket 13-49, GN Docket No. 18-357, at 2 (filed July 18, 2019) (urging the Commission resolve outstanding regulatory and spectrum uncertainty).

[49] *See* Letter from Hilary M. Cain, Director, Technology and Innovation Policy, Toyota, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 13-49 (filed Apr. 26, 2019).

[50] Letter from Neil J. Pedersen, Executive Director, Transportation Research Board, ET Docket No. 13-49, GN Docket 18-357, at 1 (filed Jun. 28, 2019).

[51] We note that under the existing DSRC licensing rules, licensees must place roadside units in operation within 12 months of the date of registration. 47 CFR § 90.155(i).

[52] *See generally* 5GAA Waiver Request.

[53] *See, e.g.*, Volkswagen Group of America, Inc. Comments, GN Docket No. 18-357, at 1 (Jan. 30, 2019); Letter from John F. Kwant, Global Director, Government Relations, Ford Motor Company to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-357, ET Docket No. 13-49 (filed Aug. 23, 2019).

that C-V2X is comprised of two complementary communications modes for vehicular operations: peer-to-peer communications (which includes vehicle-to-vehicle ("V2V") communications, vehicle-to-roadside infrastructure ("V2I") communications (e.g., safety and traffic information), and vehicle-to-pedestrian communications), and cellular network communications ("C-V2N").[54] In its waiver request, 5GAA states that C-V2X's peer-to-peer mode communications has performance advantages with respect to communications range, non-line-of-sight performance, resiliency to interference, and congestion control as compared to DSRC.[55] It further contends that the C-V2X protocol provides an evolutionary path to 5G and subsequent wireless generations that will amplify and expand upon the safety and other driving applications.[56] Further, it asserts that the cost efficiencies associated with C-V2X—that it can be economically integrated into vehicles, can leverage today's cellular networks and tomorrow's 5G networks to provide enhanced functionality and reliability at reduced costs, and its evolutionary path to 5G integration with associated economies of scale—enables an accelerated timeline for deployment.[57] In the past few months, 5GAA has supplemented the record with additional information on C-V2X related developments.[58] We also note, however, that other automakers and interested parties in recent filings have expressed support for continuing to authorize the 5.9 GHz band for DSRC, asserting that DSRC is the better technological approach.[59] Some commenters also express concern about the investments that have already been made in DSRC.[60]

26. Based on the recent technological developments and growing support for C-V2X, and the limited deployment of DSRC, we propose that authorizing C-V2X in this 20-megahertz would promote

[54] As described more fully by 5GAA, "C-V2X is comprised of two complementary communications modes for vehicular operations: peer-to-peer (called PC5 in 3GPP specifications) and network (called Uu in the specifications) communications. Peer-to-peer mode communications, which can operate independently of cellular networks and without a network subscription, include: (1) vehicle-to-vehicle ("V2V") communications, which are expected to be used to communicate safety information between nearby vehicles to prevent collisions; (2) vehicle-to-roadside infrastructure ("V2I") communications (e.g., traffic signals, variable message signs, etc.), which are expected to communicate safety and traffic information, to prevent accidents associated with roadway conditions and improve traffic efficiency, and (3) vehicle-to-pedestrian communications, which are expected to be used to communicate safety information between vehicles and other road users such as pedestrians, bicyclists, motorcyclists, etc. to prevent accidents. To augment these peer-to-peer mode communications, C-V2X's network ("V2N") mode capabilities allow vehicles to communicate with the rest of the world through cellular networks. These V2N mode communications enable key supporting functions for the peer-to-peer mode communications uses and expand the universe of applications enabled by C-V2X services." 5GAA Apr. 3, 2019 *Ex Parte* at 7 n.28.

[55] 5GAA Waiver Request at 7-13.

[56] 5GAA Waiver Request at 13-16.

[57] 5GAA Waiver Request at 19-20.

[58] *See, e.g.*, 5GAA Apr. 3, 2019 *Ex Parte.* It also has submitted an updated report on C-V2X functional and performance testing. 5GAA July 8, 2019 *Ex Parte* (attaching revised report titled "V2X Functional and Performance Test Report; Test Procedures and Results"). 5GAA also has noted that in March 2019 3GPP was making additional progress in its efforts to ensure that C-V2X features are included in the next 5G standard. 5GAA Apr. 3, 2019 *Ex Parte* at 1 (citing upcoming 3GPP studies). *See* 3GPP, 3GPP Features and Study Items, http://www.3gpp.org/DynaReport/FeatureListFrameSet.htm (identifying a study on 5G NR Vehicle-to-Everything as part of the feature and study item list for Release 16). 3GPP is a global standards body for cellular technologies.

[59] *See, e.g.*, Letter from Hilary M. Cain, Director, Technology and Innovation Policy, Toyota, to Marlene H. Dortch, Secretary, FCC, ET Docket 13-49, GN Docket No. 18-357 (filed Aug. 15, 2019); American Association of State Highway and Transportation Officials (AASHTO) Comments, GN Docket No. 18-357 (Aug. 19, 2019); Aptiv Comments, GN Docket No. 18-357.

[60] *See, e.g.*, American Trucking Associations Comments, GN Docket No. 18-357 (Feb. 8, 2019); Institute of Transportation Engineers Comments, GN Docket No. 18-357 (Jan. 18, 2019) (comments filed in ECFS under the name Jeffrey Lindley); Utah Department of Transportation Comments, GN Docket No. 18-357 (Jan. 18, 2019).

the development and deployment of ITS applications in the 5.9 GHz band. Recognizing that the views of interested parties on how best to make use of the 5.9 GHz band for ITS have been evolving in recent months, we seek to develop an up-to-date record to inform our decision. Would authorizing C-V2X in this spectrum be the best means for promoting effective use of this spectrum for ITS, both in terms of maximizing the potential benefits of using 5.9 GHz spectrum for vehicular-related systems (including safety features) and promoting rapid deployment of ITS in the band? We seek comment on the available technical studies on C-V2X that should inform our consideration of C-V2X, including any recent studies that provide information about how C-V2X would operate in the 5.9 GHz band. Considering that C-V2X is comprised of two complementary modes of communications—both peer-to-peer and cellular network communications—we request that commenters provide detailed information on precisely how C-V2X communications would employ use of 5.9 GHz band frequencies, and how it would integrate and make use of the commercial mobile network infrastructure as part of C-V2X.

27. We also seek comment on how C-V2X would promote synergies with evolving technologies that use other spectrum resources and that will advance vehicular safety and other intelligent transportation capabilities of today and those anticipated in the coming years. We request comment from motor vehicle manufacturers, the associated automotive industry, and communications companies regarding authorization of C-V2X operations in this spectrum, including the extent to which their views have evolved in recent months. 5GAA asserts that the cost efficiencies associated with C-V2X—that it can be economically integrated into vehicles, can leverage today's cellular networks and tomorrow's 5G networks to provide enhanced functionality and reliability at reduced costs, and can provide an evolutionary path to 5G integration (with associated economies of scale)—enables an accelerated timeline for ITS deployment.[61] If C-V2X is best suited to achieve U.S. goals for ITS, how can the Commission best promote C-V2X use consistent with the goals and objectives of ITS, including safety and other vehicular ITS applications, connectivity, rapid development, and deployment?

28. *C-V2X or DSRC in the 5.895-5.905 GHz band.* We also seek comment on whether the remaining 10 megahertz (5.895-5.905 GHz) of the 5.9 GHz band should be dedicated for C-V2X as well or instead be reserved for DSRC operations. In requesting comment, we recognize that C-V2X and DSRC each are designed to support a suite of various V2X applications, including those related to vehicular safety. We seek to ensure that this 10-megahertz and the entire 30-megahertz of spectrum we are proposing for ITS, is used in a spectrally efficient manner. In recognizing that there are proponents advocating for two different technological protocols to be used in this spectrum—C-V2X and DSRC—we seek comment on how to best optimize the spectrum so that this portion of the 5.9 GHz band can effectively enable the rapid and ongoing development and implementation of transportation and vehicular safety-related functionalities and applications today and in the future.

29. We first seek comment on whether to authorize C-V2X operations in the 5.895-5.905 GHz band. In its waiver request, 5GAA made clear that it believed that ultimately more than 20 megahertz of spectrum in the 5.9 GHz band should be allocated to provide more advanced features of C-V2X in the future.[62] We request specific comment on whether making spectrum beyond the 20 megahertz we specifically propose for C-V2X could be necessary and appropriate for enabling the development and deployment of advanced C-V2X applications in the band. What additional C-V2X features potentially would be enabled? Commenters that support this approach should explain how C-V2X would make use of the entire 30 megahertz for ITS services and applications, and the potential benefits of this approach.

30. 5GAA indicates that in addition to the 20-megahertz channel requested in its waiver request, it also desires a 40-megahertz channel (i.e., 60-megahertz total) for advanced vehicular services.[63]

[61] 5GAA Waiver Request at 19-20.

[62] 5GAA Waiver Request at 22.

[63] 5GAA Apr. 3, 2019 *Ex Parte* at 11-12.

5GAA contends that the C-V2X protocol provides an evolutionary path to 5G and subsequent wireless generations that will amplify and expand upon the safety and other driving applications.[64] If we adopt our proposal to provide 45-megahertz of spectrum for unlicensed operations in this band, such a large provision of spectrum for C-V2X would not be possible. Nor does it appear that such an authorization in the 5.9 GHz band makes much sense. The Commission is already on the path to make substantial mid-band spectrum available for 5G in the 2.5 GHz and 3.5 GHz bands, and is proposing to do so in the 3.7 GHz band, so allocating a larger spectrum designation in the 5.9 GHz band as a path to 5G appears unnecessary. We nonetheless seek comment on 5GAA's assertions that 60 megahertz is needed for C-V2X so that the technology planned for the band can evolve to include 5G systems. Is it necessary to plan for such systems in the 5.9 GHz band? If so, can 20 or 30 megahertz support 5G automotive applications? What advanced safety applications would be offered on a future 5G system? Finally, we seek comment on whether other 5G spectrum the Commission has made and is making available could be used to support additional C-V2X applications rather than the 5.9 GHz band. Commenters should address how 5G systems might fit into the overall connected vehicle ecosystem.

31. Alternatively, we seek comment on whether the 5.895-5.905 GHz spectrum segment instead should be reserved for DSRC. Although these two technologies are mutually incompatible (and thus cannot both be authorized to operate on a single channel without causing harmful interference), some commenters have expressed support for making 5.9 GHz spectrum available for both DSRC and C-V2X.[65] As noted above, several prefer deployment of DSRC in the band, and have expressed concern about investments that have already been made in DSRC. We thus seek comment on whether the Commission should continue to set aside this 10 megahertz of spectrum for DSRC. We request comment on the kinds of DSRC-based services that would be possible using 10 megahertz of spectrum. What effect would our proposals have on any applications delivered using Channel 172 and Channel 184, the two DSRC channels that the Commission designated for safety of life applications?[66] Can any such services be provided in the 10-megahertz at 5.895-5.905 GHz? What would be necessary to ensure that DSRC operations adjacent to C-V2X would be compatible? Are there any ITS services that DSRC would provide that cannot effectively be provided using C-V2X? Is dividing the 30 megahertz of ITS spectrum between C-V2X (20 megahertz) and DSRC (10 megahertz) useful and spectrally efficient when it comes to making use of this 5.9 GHz spectrum for ITS services? We ask that commenters supporting DSRC in this 10-megahertz discuss the benefits and costs of their preferred approach. We also seek comment on whether there is a more appropriate division of spectrum between C-V2X and DSRC.

B. Transition of Existing DSRC Operations

32. The proposals in this Notice may require DSRC incumbents to transition their operations out of some or all of the 5.9 GHz band. We seek comment on possible transition paths. To assess the potential effect of such a transition, we seek up-to-date information on actual DSRC operations under existing licenses, as well as the various uses of ITS that have been implemented through DSRC technology in this band. Incumbent DSRC operations fall into two categories: DSRC roadside units, which are licensed (on a non-exclusive, shared basis) pursuant to our Part 90 rules, and on-board units, which are licensed-by-rule under Part 95.[67] The Commission's databases show there are approximately

[64] 5GAA Waiver Request at 13-16.

[65] *See, e.g.*, Honda Comments, GN Docket No. 18-357 (Jan. 25, 2019).

[66] As shown in Appendix A Figure 1, Channel 172 occupies 5.855-5.865 GHz and Channel 184 occupies 5.915-5.925 GHz. *See* 47 CFR §§ 90.377 n.2, n.4 and 95.1511 n.2, n.4. We note that under our proposal, the amount of spectrum we would retain for ITS purposes (30 megahertz) would still be greater than the amount that was dedicated for public safety purposes on Channels 172 and 184 (20 megahertz).

[67] DSRC roadside units are licensed on the basis of non-exclusive geographic areas under Part 90 (Subpart M) of the Commission's rules, 47 CFR §§ 90.371-.383. DSRC on-board units are authorized under Part 95 (Subpart L) of the Commission's rules, 47 CFR §§ 95.3101-3189.

100 current active licenses for DSRC roadside unit deployments throughout the country.[68] Do the locations of roadside units registered in our licensing database provide a complete and accurate representation of the deployments under these licenses? The Commission does not track the deployment of on-board units that are licensed-by-rule under Part 95, which by definition would have been installed on vehicles, and such operations do not have a specific expiration date. To what extent are DSRC operations concentrated in certain parts of the 5.9 GHz band, and does use of the band vary between on-board and roadside units? Commenters are invited to submit information about the scope of deployment of such on-board units including, if available, the number of units deployed in consumer vehicles versus the number deployed in state, local, Tribal, or other governmental vehicles.

33. To what extent are these existing DSRC deployments anticipated to be used on a long-term (versus demonstration) basis, and what is the lifespan of existing DSRC pilot projects? To the extent we adopt the proposals detailed in this Notice, would operators of existing DSRC deployments be likely to pursue C-V2X-based solutions, re-channelize to the remaining DSRC channel (if we adopt such a plan), or simply wind-down operations? To the extent we grant new or renew existing DSRC authorizations, should we only prescribe such authorizations for a relatively short period of time?[69]

34. We propose to modify existing DSRC licenses to allow operation in only the 5.895-5.925 GHz sub-band to the extent that licensees want to operate a C-V2X system or only in 5.895-5.905 GHz to the extent this sub-band is retained for DSRC systems and the licensees want to continue their DSRC operations. We seek comment on these proposals and appropriate transition paths.[70] How would the proposed modifications affect current licensees with operational sites? How might statutory limitations or Commission policy inform the actions that the Commission should take as part of any transition plan? We note that section 316 of the Act gives the Commission authority to modify entire classes of licenses by a rulemaking or adjudication, but that this authority has been interpreted not to extend to any "fundamental change" to the terms of a license.[71] What obligations does section 316 of the Communications Act (or any other provision of the Act) impose on the Commission with respect to incumbent DSRC operations if the Commission were to reallocate the band under any of the proposals on which we seek comment above? Are there legal constraints to the kinds of actions that the Commission could take in modifying or discontinuing DSRC operations?

35. As noted above, DSRC roadside units operate on a non-exclusive licensed basis under Part 90, while DSRC on-board units operate under our Part 95 rules and do not require individual license authorizations (i.e., they are "licensed by rule"). Are there any transition considerations for on-board units that are different than considerations for roadside units? Considering the limited nature of deployment of on-board units in vehicles and their potential inability to communicate with ITS infrastructure not using DSRC technology, or communicate with other on-board vehicle units not using DSRC, should we take any actions to remove them from service or require other suitable modifications consistent with the revisions to the 5.9 GHz band that we ultimately adopt? Would such units remaining in vehicles impact unlicensed operations assuming the proposals in this Notice are adopted? If on-board

[68] As of Nov. 5, 2019, the Commission's Universal Licensing System shows 107 active licenses for DSRC roadside units with expiration dates ranging from September 14, 2020 to August 19, 2029. These geographic licenses authorize roadside unit operations by various cities, counties, states, and private entities at locations across the country.

[69] *See* 47 U.S.C. § 307(c)(1).

[70] DSRC roadside units are licensed on the basis of non-exclusive geographic areas under Part 90 (Subpart M) of the Commission's rules, 47 CFR §§ 90.371-.383 ("Roadside Units"). DSRC on-board units are authorized under Part 95 (Subpart L) of the Commission's rules, 47 CFR §§ 95.1501-.1511 ("On-Board Units").

[71] *Cellco Partnership v. FCC*, 700 F.3d 534, 543-44 (D.C. Cir. 2012) (section 316's power to modify existing licenses does not allow the Commission to fundamentally change those licenses); *see also Community Television v. FCC*, 216 F.3d 1122, 1140-41 (D.C. Cir. 2000).

units remain in vehicles and DSRC licenses remain able to operate only in the 5.895-5.905 GHz sub-band, what effect, if any, would unlicensed operations have on these DSRC units?

36. Should we allow existing DSRC roadside infrastructure to continue to operate under the licenses they hold until the end of their license term without renewal expectation? We seek comment on whether such an approach would adversely affect the introduction of unlicensed operations and C-V2X applications. In addition, we request comment on an appropriate transition timeline for all DSRC operations under any of the approaches we discuss above. For instance, would a six-month period in which existing licensed DSRC operations and all on-board units operating pursuant to our Part 95 rules would have to re-channelize to the remaining DSRC channel (if we retain a DSRC option), migrate to C-V2X-based operations, or discontinue service be appropriate? Should we consider adopting a shorter or longer transition period? Finally, to the extent that we adopt revisions requiring a transition of DSRC operations, we request comment on any other considerations or approaches that the Commission should take to effectuate an appropriate transition.

C. Technical Rules

37. *Vehicular-Related Communications in the 5.895-5.925 GHz Sub-band*. We propose to adopt rules for vehicular-related communications in this sub-band that largely follow the Commission's approach when the rules for DSRC operations were adopted.

38. C-V2X is a standards-based communications system based on the 4G LTE-Pro system in 3GPP Release 14, with additional standard work currently underway to develop 5G C-V2X peer-to-peer mode.[72] 5GAA has suggested that Commission adopt proposed technical rules for C-V2X operations that are based on the 3GPP standard and include:

- 20 dBm antenna input power for all C-V2X devices (vehicular, portable, and roadside units);
- Equivalent isotopically radiated power (EIRP):
  - 23 dBm for vehicular and portable units; and
  - 33 dBm for roadside units;
- Out-of-band emissions (OOBE) measured at the antenna input (i.e., conducted OOBE limits) limited to:
  - -29 dBm/100 kHz at the band edge;
  - -35 dBm/100 kHz ± 1 megahertz from the band edge;
  - -43 dBm/100 kHz ± 10 megahertz from the band edge; and
  - -53 dBm ± 20 megahertz from the band edge.
- OOBE radiated limits: All C-V2X on-board units and roadside units will limit emissions to -25 dBm/100 kHz EIRP or less outside the band edges of 5.905 GHz and 5.925 GHz.[73]

39. We propose that the technical rules be based on the 3GPP standard consistent with those detailed above. We seek comment on these rules and any alternatives that should be considered. Commenters should address how any technical rules they support ensures the ability of C-V2X operations to deliver services while also ensuring compatibility among different nearby spectrum users (i.e., how the potential for causing interference to other services is minimized). Commenters should specifically address any differences between these proposals, especially with respect to the OOBE limits, and the

[72] 3GPP, Release 14, http://www.3gpp.org/release-14 (last visited Oct. 17, 2019); *see also* 5GAA Petition for Waiver at 16.

[73] 5GAA Apr. 3, 2019 *Ex Parte* at Appendix C.

existing DSRC rules. Additionally, we further propose that the transmit power limit for C-V2X operation be defined over its channel bandwidth. We seek comment on this proposal and ask whether a different channel bandwidth for compliance purposes would be more appropriate. Additionally, we are proposing both conducted and radiated OOBE limits for C-V2X equipment, which deviates somewhat from past Commission practice, and seek comment on these proposals.

40. In many cases, we expect that C-V2X will be designed with integrated antennas which make conducted measurements difficult as there may not be easy access to an antenna port, or a modified device may need to be obtained from the manufacturer for compliance testing. Moreover, antennas do not always have the same efficiency in-band as out-of-band. We seek comment on the relative in-band versus out-of-band efficiency of antennas in this frequency range and whether both conducted and radiated emissions limits are necessary.

41. We also seek comment on whether devices should be required to comply with both the conducted and radiated limits or only one of the limits. Further, we seek comment on the proper reference for the OOBE limits—should it be the channel edge or the band edge (noting that under our proposal a single 20-megahertz C-V2X channel encompasses the entire band, but if we were to permit C-V2X across the entire 30-megahertz, there would presumably be a 10-megahertz channel adjacent to a 20-megahertz channel and each channel would no longer encompass the entire band)?

42. We propose to modify the existing DSRC-based rules in Parts 90 and 95 to accommodate C-V2X operations in the 5.905-5.925 GHz band, as set forth in Appendix B. We further propose that, if we permit C-V2X operations across the entire 5.895-5.925 GHz band, we would extend these proposed rules to encompass that entire 30 megahertz. We seek comment on the specific language of these proposed rules, including the efficacy and technical feasibility of the proposed technical rules.

43. Although we propose specific rules consistent with those suggested by 5GAA, we also seek comment on alternatives that are based on the existing DSRC rules or some other regulatory scheme. Part 90 rules limit roadside unit antenna height to 8 meters and permit a variety of EIRP levels for DSRC operations ranging from 23 dBm to 44.8 dBm. Those rules generally permit a maximum of 33 dBm EIRP (the same limit 5GAA suggests for C-V2X) for private sector systems and the higher power only for state or local government entities.[74] Should we provide additional power to C-V2X stations commensurate with the EIRP levels permitted under the DSRC rules? Should additional power be permitted only for certain applications, such as vehicle-to-network or roadside unit to network communications? Could more power be permitted for all licensees or limited to only government entities as is the case under the current rules? Or would uniform power levels for all users better serve the public and avoid the potential for harmful interference? Should antenna height be a factor in how much power is permitted? Is an 8-meter limit appropriate or some other limit? Commenters advocating for technical limits similar to the existing DSRC rules should address how their preferred rules prevent harmful interference to nearby services.

44. Our current ITS rules incorporate by reference the American Society for Testing and Materials (ASTM) EE2213-03ASTM E223313-03 standard and require roadside units to comply with the provisions of that standard.[75] Since its inception, the standard has been superseded by a different standard, the IEEE 802.11p.[76] We now seek comment on whether we should incorporate by reference the

[74] *See* 47 CFR § 90.377. The current rule allows powers of 33dBm per 10-megahertz channel or 23 dBm per 20-megahertz channel. The control channel and the V-2-I channel permit even higher power for state and local government entities. Our proposal to allow 33 dBm for a 20-megahertz CV2X channel is higher than what the current rules allow for a comparable channel. However, it is 3 dB less than what would be expected from a typical DSRC operation where licensees could operate two adjacent 10-megahertz channels at 33 dBm.

[75] *See* 47 CFR § 90.379.

[76] The IEEE 802.11p-2010 amendment to the 802.11 standard was superseded and became part of the full IEEE 802.11-2012 standard. That standard has subsequently been superseded by IEEE 802.11-2016.

latter standard for DSRC operations. Similarly, and to promote compatibility among vehicles for delivery of safety services, we seek comment on whether 3GPP standard(s) for C-V2X operations should be incorporated by reference and required for all devices operating in the 5.905-5.925 GHz band, or alternatively in the entire 5.895-5.925 GHz band should we permit C-V2X operations in that band. What are the trade-offs in terms of deployment speed, safety and cost between mandating a particular standard for devices and leaving the choice of equipment to each manufacturer or automotive company? Commenters that advocate for mandating a particular standard should address how the Commission or industry could ensure that devices could be upgraded as the standard is upgraded to incorporate new capabilities and applications.

45. To the extent we retain provisions for DSRC operations in the 5.895-5.905 GHz band, we propose to retain the existing Part 90 and Part 95 technical and coordination rules that currently apply to DSRC roadside unit and on-board unit operations on that channel (currently designated as DSRC Channel 180).[77] This includes a power limit of 23 dBm EIRP and adherence to the current OOBE limits. We seek comment on this proposal. Should different limits be permitted? For example, should we permit 33 dBm EIRP levels similar to the power level proposed for C-V2X? If so, what additional measures might need to be imposed on DSRC operations to ensure there is no increased interference to DoD radars? Also, to the extent we retain provisions for DSRC, it would be adjacent to the C-V2X band. Are there any additional technical rules we should adopt for DSRC and/or C-V2X to facilitate their respective operations under this adjacent-channel arrangement?

46. *Incumbent protection.* The 5.9 GHz band also contains allocations for Federal Radiolocation Services and the non-Federal Fixed Satellite (Earth-to-space) on a primary basis and the Amateur Service on a secondary basis for non-Federal use.[78] The 5.850-5.875 GHz segment of the 5.9 GHz band is designated internationally for Industrial, Scientific, and Medical (ISM) applications.[79]

47. We propose to require C-V2X equipment to comply with the existing DSRC rules for protection of the primary 5.9 GHz band Federal Radiolocation Service. The Department of Defense (DoD) operates fixed and mobile radars in the band for surveillance (including airborne surveillance), test range instrumentation, airborne transponders, and testing in support of the tracking and control of airborne vehicles. Because of the potential for these operations to cause harmful interference to DSRC operations and the need to protect the federal radars from harmful interference, the Commission adopted 75-kilometer coordination zones around 59 locations (with the recognition that NTIA may subsequently authorize additional locations).[80] In addition, DSRC roadside units are not protected from harmful interference caused by incumbent federal radar operations.[81] We believe that requiring C-V2X equipment to likewise coordinate installations within 75-kilometer coordination zones represents the most straightforward approach for enabling compatibility with federal operations. We seek comment on this proposal. Specifically, we seek comment on whether C-V2X operations at the proposed power levels would in any way alter the previous assumptions for sharing with DoD radars and whether there is an increased interference potential to the DoD radars from the more densely deployed C-V2X operations and what measures might we establish for C-V2X equipment to ensure the radars are not subject to harmful interference. Commenters should address the potential impact from both roadside and onboard units and in the event that harmful interference does occur, provide information as to how such interference could

[77] *See* 47 CFR §§ 90.377, 95.3163.

[78] *See* 47 CFR § 2.106. Under the existing rule, the primary non-Federal Mobile Service allocation in the 5.850-5.925 GHz band is limited to DSRC operating in the ITS. 47 CFR § 2.106 Footnote NG160.

[79] *See* 47 CFR § 2.106 Footnote 5.150.

[80] 47 CFR § 90.371(b). Under existing rules, NTIA subsequently may authorize additional locations that would receive protection through coordination. 47 CFR § 90.371(c).

[81] 47 CFR § 90.371(b).

be mitigated by requiring technical or operational constraints on the C-V2X operations. We will continue to work with the NTIA and DoD to protect against harmful interference to DoD radars.

48. We also seek comment on whether there are alternate methods to ensure that harmful interference is not caused to federal radars from C-V2X devices if we adopt the proposals included in this Notice. Have there been any tests or studies undertaken by C-V2X proponents demonstrating that the C-V2X protocol provides comparable or greater protection to federal radars as compared to DSRC devices? Alternatively, could dynamic or location awareness methods be used by C-V2X systems to automatically reduce power when nearing any of the sites designated for coordination, and could such provisions be made applicable to all C-V2X equipment.[82] Under such a regime, how would systems be updated if new Department of Defense radar sites are added? Proponents of any of these options should provide details specifying how we could modify the interference protection rules.

49. We propose that no additional provisions are needed to protect non-federal incumbent operations in the 5.9 GHz band from new C-V2X operations. The primary non-federal FSS (Earth-to-space) operations at 5.9 GHz band are part of the "extended C-band" and provide uplinks (Earth-to-space) that are limited to international inter-continental systems and subject to case-by-case electromagnetic compatibility analysis.[83] The Commission's International Bureau Filing System shows 80 current FSS licenses for this band held by 23 different licensees. Because these systems are limited to international inter-continental transmissions, the majority of stations are near the coastlines, but there are some inland stations.[84] Further, to enable the required international inter-continental transmissions, these stations transmit to satellites located at longitudes that are not located over the U.S.[85] The Commission previously determined that no coordination requirement is needed to protect FSS uplink operations from harmful interference due to DSRC transmissions.[86] Because C-V2X operations are anticipated to be similar to DSRC operations in their potential for interference, we propose that coordination with FSS stations is unnecessary to ensure protection from harmful interference and seek comment on this assessment. Very little energy from C-V2X operations which are anticipated to be low to the ground will reach the satellites receiving within the 5.9 GHz band. We base this contention on the fact that that the longitudinal locations of the satellites are well off the U.S. coastlines, the great distance to the geostationary arc, and the relatively low power of C-V2X devices as compared to highly directional, high powered FSS earth stations. Thus, we believe there is a very low potential for harmful interference at the FSS satellites from C-V2X operations. We seek comment on this proposal.

50. We further propose that to the extent DSRC operations remain in the 5.9 GHz band, such stations continue to operate under the current rules; i.e., no coordination is necessary with FSS. We seek comment on this proposal. We ask commenters to also provide information on the types of uses this band supports and how much this band is actually used (i.e., is it used continuously or only as a back-up if other links go down?). We also note that ITS America and SIA stated that they have developed a sharing

[82] Our consideration of on-board units in this regard could become relevant if we adopt final rules that specify different maximum power limits for DSRC and C-V2X on-board units.

[83] 47 CFR § 2.106 Footnote US245; 47 CFR § 2.108.

[84] Most earth stations are located in California on the west coast and are spread across many states (e.g., Maine, New York, New Jersey, Maryland, Virginia, Florida, etc.) on the east coast. However, there is also one FSS earth station in Illinois, Tennessee, and Wyoming.

[85] For example, to enable communications between the U.S. and Europe or Asia, the satellites tend to be located over the Atlantic and Pacific Oceans, respectively.

[86] *DSRC Report and Order*, 14 FCC Rcd at 18228, para. 15 (finding the potential for harmful interference to DSRC operations was minimal). The Commission observed that the DSRC standard was designed to protect co-channel incumbent operations from harmful interference and noted that FSS earth station uplinks typically use highly directional antennas pointed toward the geostationary orbital arc and away from low-powered DSRC applications that would be pointed toward highways.

protocol between DSRC and FSS operations.[87] Have any DSRC users or FSS licensees successfully coordinated sites using this sharing protocol? Why or why not? Given the passage of time, changes in technology and changes in spectrum usage, are the procedures of this sharing protocol still applicable? Would this sharing protocol also be applicable for C-V2X? If not, what changes are needed? Should the Commission codify coordination procedures, or should they remain under the purview of the interested parties where they can be more easily changed and updated as technology or band usage changes? Although we propose that C-V2X and FSS uplink operations can co-exist without harmful interference, in an abundance of caution, we also seek comment on whether any testing or studies have been conducted by proponents of C-V2X that have considered FSS incumbents, and how those results might inform the final rules we adopt.

51. Noting that C-V2X would operate under the primary Mobile Service allocation in the 5.9 GHz band and that the Amateur Service also shares the 5.9 GHz band through a secondary allocation,[88] we propose that no additional rules are necessary to accommodate co-channel C-V2X use with the Amateur Service. Similarly, we propose that no additional rules are necessary to protect C-V2X devices from ISM operations permitted under Part 18 of our rules in the 5.850-5.875 GHz portion of the band.[89] We seek comment on these proposals.

52. Lastly, in conjunction with our proposed use of the 5.895-5.925 GHz sub-band for vehicular-related systems, we propose conforming modifications to the U.S. Table. Under Footnote NG160 in the U.S. Table, use of the non-Federal Mobile Service in the 5.850-5.925 GHz band is limited to DSRC operating in the ITS radio service.[90] We propose to modify Footnote NG160, as shown in Appendix B, to remove the reference to DSRC and refer to ITS generically and to limit ITS use of the Mobile Service to only the 5.895-5.925 GHz band. We seek comment on this proposal.

53. *Unlicensed Operations in the 5.850-5.895 GHz Sub-band.* Unlicensed devices operate under the conditions of not causing harmful interference and accepting any interference from an authorized radio station.[91] We propose that U-NII-4 device rules be placed in Part 15, subpart E along with the existing U-NII rules and be subject to all of the general Part 15 operational principles. We seek comment on this proposal. We also invite comment on the specific rules that should govern operation of U-NII-4 devices in the 5.850-5.895 GHz sub-band. Because the proposed U-NII-4 band at 5.850-5.895 GHz is located immediately adjacent to the existing U-NII-3 band at 5.725-5.850 GHz, and we expect that manufacturers will design devices that span the U-NII-3 and U-NII-4 bands to implement the widest channel available under the standards—160-megahertz—we propose that U-NII-4 devices be subject to similar technical and operational rules that apply to the U-NII-3 band.[92] As an initial matter, we propose

[87] *See* Letter from Carlos M. Nalda, Mintz Levin, on behalf of SIA, ITS America, and American Association of State Highway and Transportation Officials, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 01-90, EB Docket No. 98-95 (filed Feb. 18, 2008).

[88] 47 CFR § 2.106. Under the Commission's rules, stations of a secondary service must not cause harmful interference to, and cannot claim protection from harmful interference from, stations of primary services to which frequencies are already assigned or may be assigned at a later date. 47 CFR § 2.104(d)(3)(i), (ii).

[89] *See* 47 CFR § 2.106 Footnote 5.150. Part 18 rules do not limit the in-band power level of ISM devices operating in ISM bands. However, most higher power devices operate in industrial settings where they should generally be far removed from C-V2X devices. 47 CFR § 18.107. Part 18 devices must not cause harmful interference to authorized radio service operations outside of the ISM bands. 47 CFR § 18.111.

[90] 47 CFR § 2.106 Footnote NG160.

[91] *See* 47 CFR § 15.5(b)-(c).

[92] *See* 47 CFR § 15.407.

that U-NII-4 devices be permitted to operate at the same power levels as U-NII-3 devices.[93] We seek comment on this proposal or whether we should adopt different power levels?

54. We propose that U-NII-4 devices, or devices that operate across a single channel that spans the U-NII-3 and U-NII-4 bands, meet an OOBE limit of -27 dBm/MHz at or above 5.925 GHz, which is the same limit required for U-NII-3 devices at this frequency. We note that, for U-NII-3 devices, the -27 dBm/MHz limit increases incrementally closer to the edge of the U-NII-3 band.[94] Because the U-NII-4 band is above the U-NII-3 band and closer to adjacent services (e.g., ITS services in the adjacent portion of the 5.9 GHz band (5.895-5.925 GHz) and 6 GHz fixed services), should we also establish a separate limit at the upper U-NII-4 band edge (i.e., at 5.895 GHz)?[95] If so, what should this limit be? Should the slope of the OOBE from U-NII-4 devices at the upper edge of the band be adjusted to match the OOBE limits from U-NII-3 devices or should a different limit be established? If the OOBE limits from the U-NII-4 band are adjusted to match the U-NII-3 band OOBE limits, can unlicensed devices and ITS devices operate directly adjacent to each other as the emissions into the ITS band would be identical from either U-NII-3 or U-NII-4 devices? We seek comment generally on the OOBE limits we should apply at the upper end of the U-NII-4 band and whether any spectrum must be reserved to protect ITS services,[96] and if so, whether such spectrum should be in the U-NII or ITS segment of the 5.9 GHz band.

55. We further propose that U-NII-4 devices, or devices that operate across a single channel that spans the U-NII-3 and U-NII-4 bands, meet the same OOBE limits as U-NII-3 devices at the lower edge of the combined U-NII-3 and U-NII-4 band, i.e., at 5.725 MHz. Because we expect devices designed for the U-NII-3 and U-NII-4 bands to be similar and therefore compatible with each other, we do not believe it is necessary to set a separate OOBE limit for U-NII-4 devices at the U-NII-3/U-NII-4 band edge.[97] We seek comment on these proposals as well as seeking comment on whether there are alternative OOBE limits that we should adopt.

56. Our proposals support a separate U-NII-3 and U-NII-4 band to provide flexibility for designing U-NII-3 equipment under the less stringent OOBE rules at the upper edge of the band. Our proposals also provide flexibility for devices to operate across the U-NII-3 and U-NII-4 bands using the widest bandwidths permitted under the 802.11 standard. Alternatively, we could expand the U-NII-3 band and implement a single set of OOBE limits for the combined 5.725-5.895 GHz band using the OOBE limits proposed for U-NII-4 band devices or devices that operate across a single channel that spans the U-NII-3 and U-NII-4 bands. What advantages would a single band under uniform rules provide?

---

[93] *See* 47 CFR § 15.407(a)(3). The maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

[94] *See* 47 CFR § 15.407(b)(4). The U-NII-3 rules permit devices to operate at 27 dBm/MHz at the U-NII-3 band edge. The permitted OOBE levels then decrease linearly to 15.6 dBm/MHz 5-megahertz and linearly to 10 dBm/MHz 25-megahertz from the band edge, ultimately requiring devices to meet the -27 dBm/MHz limit 75-megahertz from the band edge (i.e., at 5.650 GHz on the lower end and 5.925 GHz on the upper end).

[95] *Id*. U-NII-3 devices are only required to meet an OOBE limit of -4.8 dBm/MHz at the upper edge of the U-NII-4 band (i.e., 5.895 GHz).

[96] The current DSRC band plan reserves the 5-megahertz channel 170 (5.850-5.855 GHz) between the U-NII-3 and DSRC band. *See* 47 CFR § 90.377(b).

[97] Similarly, the rules for the U-NII-1 (5.150-5.250 GHz) and U-NII-2A (5.250-5.350 GHz) bands only require devices designed for each band to meet OOBE limits at 5.150 GHz and 5.350 GHz regardless of the band for which the device is designed. *See* 47 CFR §§ 15.407(b)(1) and 15.407(b)(2).

What would be the drawbacks, especially considering the effect on OOBE limits? We seek comment on this alternative. Under our proposal or this alternative, we also seek comment on any other rule changes that are needed to support communications across the combined U-NII-3 and U-NII-4 bands. Finally, we seek comment on how our proposals might affect device design and cost.

57. As noted above, the 5.9 GHz band is allocated on a primary basis for the Federal Radiolocation Service and is used by the Department of Defense for fixed and mobile radar operations.[98] Unlicensed U-NII-3 devices currently share spectrum with DoD radar operations in the adjacent 5.725-5.850 GHz band without implementing any special frequency avoidance techniques. Such operations were authorized in 1997, and in general sharing has been successful.[99] We propose to adopt the same technical rules (e.g., radiated power, power spectral density, etc.) for U-NII-4 unlicensed devices as apply to U-NII-3 unlicensed devices. The Commission will continue working with NTIA and DoD to examine and mitigate the potential for harmful interference to DoD radars under these proposed rules and may impose additional technical or operational constraints on the U-NII-4 devices. We seek comment on whether there are any mitigation measures, such as technical or operational conditions or constraints that would be imposed on U-NII-4 devices or operations, that we should consider to protect DoD radars in the band.

58. We also propose not to adopt any restrictions on U-NII-4 devices to account for the existing non-federal users of the band. The expected unlicensed device use cases, which primarily involve delivery of Wi-Fi signals along with the distance to FSS satellites in geostationary orbit, should protect FSS uplink operations from harmful interference. We nevertheless seek comment on whether any targeted rules are needed to ensure the protection of incumbent FSS uplink operations. If so, what types of sharing technology or techniques would be appropriate and what are the cost implications for manufacturers, vendors, and consumers? We also believe that our proposal to apply the existing U-NII-3 power rules to the 5.850-5.895 GHz band will protect co-channel secondary Amateur Service operations from harmful interference. We seek comment on this proposed approach.

D. Vehicular Applications Outside of the 5.9 GHz band

59. We seek comment on the extent to which the needs for transportation and vehicular safety-related communications and other ITS applications originally identified for the 5.9 GHz band are already being met through spectrum use outside of the 5.9 GHz band. As described above, the evolution of automotive telematics has been rapid. Many auto manufacturers now include high-tech vehicle safety technologies using other spectrum bands. For example, we recently designated 5 gigahertz of spectrum at 76-81 GHz for vehicular radars to accommodate the anticipated growth of both long- and short-range radar automotive applications that are integral to many active and passive safety features such as advanced obstacle detection and avoidance.[100] Vehicle-resident technologies are widely deployed in millions of vehicles today without using 5.9 GHz spectrum,[101] and other, more advanced vehicle safety features are under development.[102]

---

[98] 47 CFR § 2.106.

[99] *U-NII Report and Order*, 12 FCC Rcd at 1596-97 para. 46, 1610, para. 82 (establishing the 5.725-5.825 GHz (U-NII-3) band); *U-NII 5 GHz Report and Order*, 29 FCC Rcd at 4151, para. 88 (adding 5.825-5.850 GHz to the 5.725-5.825 GHz (U-NII-3) band); 47 CFR § 15.407(a)(3). We are aware of interference that occurred to an Air Force radar tracking system that has become operational at Cape Canaveral and thus seek comment on rules for U-NII-4 that will protect the radar operations.

[100] *See Amendment of Parts 1, 2, 15, 90 and 95 of the Commission's Rules to Permit Radar Services in the 76-81 GHz Band*, ET Docket No. 15-26, Report and Order, 32 FCC Rcd 8822 (2017).

[101] Vehicle-resident technologies include (but are not limited to) adaptive cruise control, automatic emergency braking for collision avoidance/mitigation, blind spot detection, and lane-keeping assist. These features typically use a suite of cameras, sonar, radar, and/or LiDAR (light detection and ranging). We also note that further development of these types of technologies continues. *See, e.g.*, 10 Astonishing Technologies That Power Google's

(continued….)

60. We seek comment on the extent to which the ITS functions originally contemplated for DSRC systems in the 5.9 GHz band are being or anticipated to be provided in other bands or through other means.[103] Is the requirement in the Intelligent Transportation Systems Act of 1998 to consider designating spectrum for ITS still relevant today?[104] Noting that the Commission's general policy has been to move away from specific spectrum designations in favor of more flexible use, is there still a need to designate spectrum for ITS? Commenters that advocate for a specific designation should provide details regarding the benefits of such a designation including those to the public as well as on equipment designers and manufacturers.

61. Commenters should also consider whether there are other spectrum bands that might be better suited for supporting ITS applications. If so, which ones? What would be the benefit of doing so, e.g., would this lead to more rapid take-up of valuable automotive safety applications? Commenters should address the extent to which some of the 5.9 GHz band might remain critical to the realization of ITS applications. Commenters that support maintaining some 5.9 GHz band spectrum for ITS applications should specify the specific transportation and vehicular safety-related functions to be accommodated in the band and how much bandwidth in this particular band is necessary to achieve those respective functional capabilities. Are all of these applications equally critical to ensure automotive safety and improve the vehicular transportation environment? We seek comment on how the Commission can ensure that ITS is used for safety of life applications. What are the trade-offs associated with other options, such as the use of different spectrum to provide ITS services? Do the potential safety benefits vary by band or service and, if so, in what way?

62. Could we modify our rules to make it easier to provide for automotive safety applications in other bands or through other radio services? What are the implications of retaining spectrum for ITS in the 5.9 GHz band relative to autonomous vehicles? We note that autonomous vehicles are already being tested and deployed using applications and technologies other than DSRC for vehicle-to-vehicle communications or other transportation or vehicular-safety related operations.

E. Benefits and Costs

63. As discussed above, our goal in the proceeding is to revise the current 5.9 GHz band plan to optimize the efficient and effective use of the band by making the band available both for unlicensed use and ITS services. We seek to evaluate the benefits and costs of our proposed approach as well as alternatives, and request comment on how to best calculate these benefits and costs. To date, the band has been underused for ITS services. Designating the 5.850-5.895 GHz band for unlicensed operations is likely to generate quantifiable benefits for consumers, stakeholders, and the American economy. Similarly, we believe removing uncertainty pertaining to the future of ITS services in the band, including the type(s) of technologies that are authorized, would promote more rapid and effective deployment of these services in the band. At the same time, we recognize that reducing the spectrum available for ITS,

(Continued from previous page)
Self-Driving Cars, https://www.national.co.uk/tech-powers-google-car/ (Google is in the process of developing fully automated cars that do not assume widespread connected vehicle technology; these systems would use vehicle-resident technologies to collect data, which an on-board computer and built-in software would interpret to map the surrounding world in real-time and to make driving decisions) (May 8, 2019).

[102] *See, e.g.*, National Highway Traffic Safety Administration, Automated Vehicles for Safety, https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety#issue-road-self-driving (last visited Dec. 12, 2019).

[103] *See, e.g.*, NCTA Sept. 25, 2019 *Ex Parte* at 1 (stating that the Commission "should not ignore the prevalence of market-driven vehicle safety technologies on the roads today," and claiming that many existing DSRC pilot projects "relate to services like traffic signal timing that are already available using other spectrum").

[104] Transportation Equity Act for the 21st Century, Pub. L.105-178, § 5206(f), 112 Stat. 107 (1998).

depending on the approach taken, potentially could lead to social costs if deployments of ITS would ever occur at wide-scale. We seek comment on how to best calculate these benefits and costs.

64. We believe that our proposal has the potential to create economic value by resolving uncertainty concerning the future designation of the 5.9 GHz band for both unlicensed uses and ITS services. Specifically, does the economic value of removing this uncertainty and providing a clear direction for use of the band under the proposed new band plan exceed the benefits that might be achieved by continuing on the path set out by the Commission in 2013, when it sought to explore sharing of the band between unlicensed and DSRC devices (and the extensive further testing that this would entail)? Insofar as our proposal provides certainty that part of the 5.9 GHz band continues to be reserved for ITS services, and would have the effect of promoting development and deployment of ITS services that make use of this band, how should we evaluate the benefits of such a determination today and into the future?

65. We seek comment on the benefits and costs of designating a significant portion of this band for unlicensed operations. One approach before us that attempted to quantify the benefits of authorizing unlicensed operations in the 5.9 GHz band is a study published by the RAND Corporation (RAND 5.9 GHz Study).[105] The RAND 5.9 GHz Study estimated as alternative quantifications of benefits, the annual contribution to Gross Domestic Product (GDP) of (i) increases in Wi-Fi throughput afforded by aggregating unlicensed spectrum in the proximate (U-NII-3) band and (ii) the value from making Wi-Fi available to more devices as a result of the extra capacity afforded by additional spectrum.[106] We note that other studies have sought to quantify the benefits of unlicensed spectrum, but most have focused on existing allocations rather than on the 5.9 GHz band specifically.[107] We request comment on the extent to which the earlier RAND 5.9 GHz Study, or other available studies, may provide an appropriate approach for quantifying the benefits associated with proposing to designate 45 megahertz at 5.850-5.895 GHz for unlicensed operations. With respect to the RAND 5.9 GHz Study, in particular, we seek comment on whether estimating the contribution to GDP of increases in Wi-Fi throughput is an appropriate way to measure the benefits of introducing unlicensed operations in the 5.9 GHz band.[108] Moreover, we seek comment on whether this approach may overstate the benefits stemming from increases in Wi-Fi throughput due to such specification problems as omitted variable bias.[109] We also

[105] Letter from Diana Gehlhaus Carew, Doctoral Fellow, RAND Corporation, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 13-49 (filed Dec. 13, 2018) (RAND 5.9 GHz Study).

[106] *See* RAND 5.9 GHz Study at 2, 14, 25. The study authors estimate that the contribution to GDP, accounting for different scenarios across both approaches, ranges between $59.8 billion and $105.8 billion. Alternatively, the authors find that dedicating the 5.9 GHz band for unlicensed use adds between $64.6 billion and $172.2 billion in consumer surplus and an additional $17.7 billion in producer surplus. Notably, the authors do not seek to estimate the potential loss of value that may result from a reduction in ITS spectrum. *See* RAND 5.9 GHz Study at 12-13, 21, 30, 33-35.

[107] *See*, *e.g.,* Letter from Danielle J. Piñeres, NCTA, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 13-49 (filed May 24, 2018) (attaching Raul Katz, Telecom Advisory Services, LLC, A 2017 Assessment of the Current & Future Economic Value of Unlicensed Spectrum in the United States.

[108] Conversely, we believe that the second approach suffers from conceptual issues—including assumptions on device data consumption rates–that lead to unusual outcomes. For instance, this approach indicates that the allocation of an additional 75 megahertz of unlicensed spectrum would lead U.S. consumers to purchase approximately an additional 146 to 160 million connected devices, which appears too high based on estimates reporting that there were between 400 million and 433 million U.S. connections in aggregate at the end of 2017. *See* RAND 5.9 GHz Study at 29-30, Tables 6.3-6.4; *Communications Marketplace Report et al*., Report, 33 FCC Rcd 12563-65, paras. 8-9 and Fig. A-1 to A-3 (2018).

[109] Omitted variables are an issue when a researcher would like to control for one or more additional variables but, usually because of data unavailability, cannot include these variables in a regression model. Wooldridge, J. M., *Econometric analysis of cross section and panel data* at 54-55 (MIT Press 2010). Although the RAND 5.9 GHz Study seeks to address endogeneity concerns such as this by, among other means, regressing the natural log of GDP (the dependent variable) on a lagged (past) throughput variable, because past throughput and current GDP could

(continued….)

seek comment on whether alternative specifications might alter the RAND 5.9 GHz Study's valuation of benefits of $59.8 billion to $96.8 billion per year across the U.S. Apart from the approach suggested in the RAND 5.9 GHz Study, we seek comment on other potential benefits, including benefits to other licensed or unlicensed users (including ITS users) that may be able to utilize unlicensed devices in providing services.

66. We also propose to measure the benefits and costs of reserving 30 megahertz of spectrum in the 5.9 GHz band for ITS, and seek specific comment on how best to evaluate these benefits and costs. In proposing to reserve 30 megahertz of spectrum in the 5.9 GHz band for ITS, we recognize that many of the technologies that will make use of 5.9 GHz band spectrum are evolving and will continue to evolve in the future. We seek comment on how to evaluate the benefits and costs of our proposal given the evolving nature of transportation and vehicular safety-related technologies, both within and outside of the 5.9 GHz band. We seek comment on the extent to which our proposal would make ITS based technologies either more or less effective.[110] To what extent are or will the types of ITS services that would be available through use of the 5.9 GHz band going to be offered using spectrum outside of the 5.9 GHz band? How should we evaluate the benefits and costs of ITS services in the 5.9 GHz band (whether for vehicular safety or other transportation-related applications) using 30 megahertz of spectrum in the band as compared with other amounts of spectrum in the band? We also ask that commenters quantify how the vehicular safety and transportation-related benefits and costs may be affected based on the authorization of C-V2X technologies in the entire 5.895-5.925 GHz sub-band, or alternatively authorizing C-V2X in the upper 20 megahertz and DSRC in the other 10 megahertz. Are there technologies presently being or likely to be developed outside of the 5.9 GHz band that would substantially substitute for benefits of ITS in the 5.9 GHz band?

67. We are cognizant that retaining 30 megahertz of spectrum for ITS in the 5.9 GHz band may have other economic benefits or costs that could be affected by our proposal. For instance, in addition to improving traffic safety, the ITS service was envisioned as having the potential to decrease traffic congestion, facilitate the reduction of air pollution, and help conserve vital fossil fuels. To what extent would these potential benefits be affected by our proposal?[111] We ask commenters to enumerate and quantify any such alternative effects. Additionally, to the extent that there are benefits and costs associated with our proposal for unlicensed operations and ITS services in the 5.9 GHz band, when and over what time horizon would they be realized?[112]

F. Alternate Approaches

68. Are there spectrum band approaches other than those discussed above that may better maximize the effective and efficient use of the 5.9 GHz band? Would creating differently sized sub-

(Continued from previous page)
have both been influenced by an omitted variable (e.g., investment in various industries), the endogeneity concern remains.

[110] Li and Kockelman suggest that the following technologies could rely on ITS: Cooperative Intersection Collision Avoidance Systems, Control Loss Warning, Forward Collision Warning, Blind Spot Warning, Lane Changing Warning, Do Not Pass Warning, Road Departure Crash Warning, V2Pedestrian, and V2Pedalcyclist. *See* Li, T., & Kockelman, K. M., Valuing the safety benefits of connected and automated vehicle technologies, in *Transportation Research Board 95th Annual Meeting* (Jan. 2016, No. 16-1468). We note that at present, many of these technologies do not rely on DSRC.

[111] *See DSRC Report and Order*, 14 FCC Rcd at 18221, para. 1. Social costs would also include any transition cost to existing DSRC licensees.

[112] For instance, whereas certain safety technologies do not depend on ITS at present, they may be improved by ITS in the future. To the extent that such improvements are made infeasible by our proposal, in comparing benefits and costs, we must appropriately discount the prospective social costs due to, for instance, the uncertainty that they materialize. Similarly, some of the benefits to unlicensed operations may not be realized until Wi-Fi devices transition to take advantage of the newly available 5.9 GHz spectrum.

bands be a better approach than our proposed band plan? Are there any additional emerging vehicle safety technologies we should consider for the 5.9 GHz band? Should we provide automakers and the transportation industry with broad flexibility to introduce additional vehicular safety communications technologies into the band, and permit any and all technologies so long as they can co-exist? This could include DSRC, C-V2X, or future spectrum use protocols that might be developed.[113] If so, how should we define successful co-existence and interoperability, and are there ways to ensure that a technology-neutral approach to any future such developments would provide ready access to the band and enable critical safety services without causing harmful interference to incumbent technologies?

69. Commenters should provide detailed justification to support specific band plan options, including the types of services that could or could not be delivered by unlicensed use or by vehicular-related services under each option. Likewise, in each case, commenters should seek to quantify the costs and benefits as well as the risks and opportunities, of the discussed alternatives relative to our proposed band plan.

IV. PROCEDURAL MATTERS

70. *Ex Parte Rules – Permit but Disclose.* Pursuant to Section 1.1200(a) of the Commission's rules,[114] this Notice of Proposed Rulemaking shall be treated as a "permit-but-disclose" proceeding in accordance with the Commission's *ex parte* rules.[115] Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentation must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter's written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with rule 1.1206(b). In proceedings governed by rule 1.49(f) or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (e.g., .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules.

71. *Comment Period and Filing Procedures.* Pursuant to Sections 1.415 and 1.419 of the Commission's rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. All filings must refer to ET Docket No. 19-138.

---

[113] *See, e.g.*, *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands et al.*, WT Docket No. 03-66, Report and Order and Further Notice of Proposed Rulemaking, 19 FCC Rcd 14165, 14216, para. 132 (2004) ("Allowing the band to be technology-neutral is consistent with our goal to make the spectrum as flexible as possible as it permits licensees and the marketplace to determine which technologies should be utilized.").

[114] 47 CFR § 1.1200(a).

[115] 47 CFR §§ 1.1200 *et seq.*

- Electronic Filers: Comments may be filed using the Commission's Electronic Comment Filing System (ECFS). *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998). Comments may be filed electronically using the Internet by accessing the ECFS: http://fjallfoss.fcc.gov/ecfs2/.
- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing. Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.
    - All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes and boxes must be disposed of before entering the building.
    - Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9050 Junction Drive, Annapolis Junction, MD 20701.
    - U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

72. People with Disabilities: To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty).

73. Availability of Documents: Comments, reply comments, and *ex parte* submissions will be publicly available online via ECFS.[116] These documents will also be available for public inspection during regular business hours in the FCC Reference Center, Federal Communications Commission, 445 12th Street, SW, CY-A257, Washington, DC, 20554. The Reference Information Center is open to the public Monday through Thursday from 8:00 a.m. to 4:30 p.m. and Friday from 8:00 a.m. to 11:30 a.m.

74. *Initial Regulatory Flexibility Analysis.* An initial regulatory flexibility analysis (IRFA) is contained in Appendix C. Comments to the IRFA must be identified as responses to the IRFA and filed by the deadlines for comments on the Notice of Proposed Rulemaking. The Commission will send a copy of the Notice of Proposed Rulemaking, including the IRFA, to the Chief Counsel for Advocacy of the Small Business Administration.

75. *Paperwork Reduction Act.* This document contains proposed new or modified information collection requirements subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, see 44 U.S.C. 3506(c)(4), we seek specific comment on how we might further reduce the information collection burden for small business concerns with fewer than 25 employees.

76. *Further Information.* For further information, contact Howard Griboff of the Office of Engineering and Technology, Policy and Rules Division, at 202-418-0657 or Howard.Griboff@fcc.gov.

V. ORDERING CLAUSES

77. Accordingly, **IT IS ORDERED** that, pursuant to the authority found in Sections 1, 4(i), 301, 302, 303, 316, and 332 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 154(i), 301, 302, 303, 316, and 332, and Section 1.411 of the Commission's Rules, 47 CFR § 1.411, that this Notice of Proposed Rulemaking IS HEREBY ADOPTED.

[116] Documents will generally be available electronically in ASCII, Microsoft Word, and/or Adobe Acrobat.

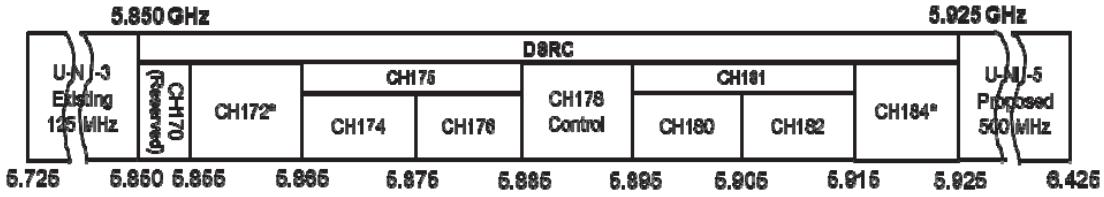
78. **IT IS FURTHER ORDERED** that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this Notice of Proposed Rulemaking, including the Initial Regulatory Flexibility Certification, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

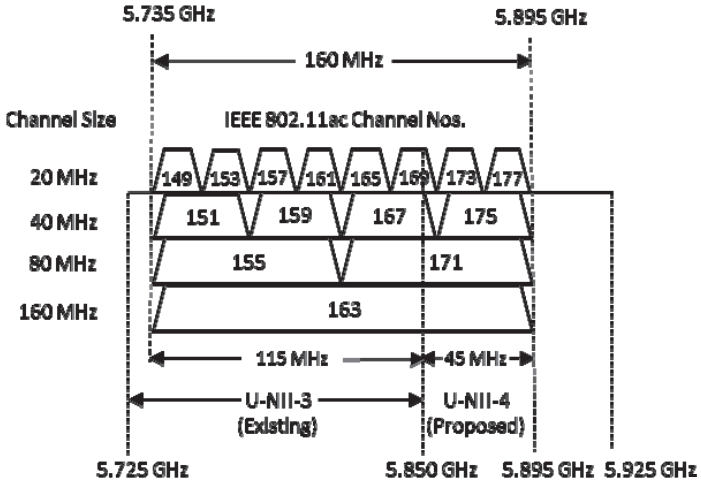
Appendix A

Figure 1:
5.9 GHz DSRC – Existing Band Plan



*Channels 172 and 184 are designated for public safety applications involving safety of life and property.

Figure 2:
160-Megahertz Channel Spanning Eight 20-Megahertz U-NII Channels from 5.735-5.895 GHz



Appendix B

Proposed Rules

For the reasons set forth in the preamble, the Federal Communications Commission proposes to amend Parts 2, 15, 90, and 95 of Title 47 of the Code of Federal Regulations as follows:

Part 2 – FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS;

GENERAL RULES AND REGULATIONS

1. The authority citation for Part 2 continues to read as follows:

Authority: 47 U.S.C. 154, 302a, 303, and 336, unless otherwise noted.

Section 2.106 is amended by revising footnote NG160 to read as follows

§ 2.106 Table of Frequency Allocations.

* * * * *

NG160 In the band 5895-5925 MHz, the use of the non-Federal mobile service is limited to operations in the Intelligent Transportation System radio service.

* * * * *

Part 15 – Radio Frequency Devices

The authority citation for Part 15 continues to read as follows:

Authority: 47 U.S.C. 154, 302a, 303, 304, 307, 336, 544a, and 549.

Section 15.401 is amended to read as follows:

§ 15.401 Scope.

This subpart sets out the regulations for unlicensed National Information Infrastructure (U-NII) devices operating in the 5.15-5.35 GHz and 5.47-5.895 GHz bands.

Section 15.403 is amended by revising paragraph (s) to read as follows:

§ 15.403 Definitions.

* * * * *

(s) *U-NII devices*. Intentional radiators operating in the frequency bands 5.15-5.35 GHz and 5.470-5.895 GHz that use wideband digital modulation techniques and provide a wide array of high data rate mobile and fixed communications for individuals, businesses, and institutions.

Section 15.407 is amended by redesignating paragraphs (a)(4) and (a)(5) as paragraphs (a)(5) and (a)(6), adding new paragraphs (a)(4), revising redesignated paragraph (a)(6), revising paragraph (b)(4), redesignating paragraphs (b)(5), (b)(6) and (b)(7) as paragraphs (b)(6), (b)(7) and (b)(8), adding new paragraph (b)(5) and revising paragraph (e) to read as follows:

§ 15.407 General technical requirements.

* * * * *

(a) ***

(4) For the band 5.85-5.895 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be

reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

* * * * *

(6) The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.895 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

* * * * *

(b)(4) For transmitters operating solely in the 5.725-5.850 GHz band:

(i) ***

(ii) ***

(b)(5) For transmitters operating solely in the 5.850-5.895 GHz band or operating on a channel that spans across 5.850 GHz:

(i) All emissions at or above 5.925 GHz shall not exceed an e.i.r.p. of −27 dBm/MHz.

(ii) All emissions below 5.725 GHz shall be limited to a level of −27 dBm/MHz at 5.65 GHz increasing linearly to 10 dBm/MHz at 5.7 GHz, and from 5.7 GHz increasing linearly to a level of 15.6 dBm/MHz at 5.72 GHz, and from 5.72 GHz increasing linearly to a level of 27 dBm/MHz at 5.725 GHz.

* * * * *

(e) Within the 5.725-.5.850 GHz and 5.850-5.895 GHz bands, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

* * * * *

Part 90 – Private Land Mobile Radio Services

Amend Subpart M to the Table of Contents of Part 90 to modify the subheading after section 90.365 and add Section 90.370 to read as follows:

Subpart M – Intelligent Transportation Systems Radio Service

* * * * *

Regulations Governing the Licensing and Use of Frequencies in the 5895-5925 MHz Band for Dedicated Short-Range Communications Service (DSRCS) and Cellular Vehicle to Everything (C-V2X) Service.

90.370 Permitted frequencies.

* * * * *

The authority citation for Part 90 continues to read as follows:

Authority: 47 U.S.C. 154(i), 161, 303(g), 303(r), 332(c)(7), 1401-1473.

Subpart A – GENERAL INFORMATION

Section 90.7 is amended by adding an entry for Cellular Vehicle to Everything (C-V2X) Communications Services in alphabetical order and modifying the entries for On-Board unit (OBU), Roadside unit (RSU) and Roadway bed surface to read as follows:

§ 90.7 Definitions.

* * * * *

Cellular Vehicle to Everything (C-V2X) Service. The use of cellular radio techniques defined by the 3rd Generation Partnership Program (3GPP) to transfer data between roadside and mobile units, between mobile units, and between portable and mobile units to perform operations related to the improvement of traffic flow, traffic safety, and other intelligent transportation service applications in a variety of environments. C-V2X Service systems may also transmit status and instructional messages related to the units involved.

* * * * *

On-Board Unit (OBU). An On-Board Unit is a DSRCS or C-V2X Service transceiver that is normally mounted in or on a vehicle, or which in some instances may be a portable unit. An OBU can be operational while a vehicle or person is either mobile or stationary. The OBUs receive and transmit on one or more radio frequency (RF) channels. Except where specifically excluded, OBU operation is permitted wherever vehicle operation or human passage is permitted. The OBUs mounted in vehicles are licensed by rule under part 95 of this chapter and communicate with Roadside Units (RSUs) and other OBUs. Portable OBUs are also licensed by rule under part 95 of this chapter.

Roadside Unit (RSU). A Roadside Unit is a DSRCS or C-V2X Service transceiver that is mounted along a road or pedestrian passageway. An RSU may also be mounted on a vehicle or is hand carried, but it may only operate when the vehicle or hand-carried unit is stationary. Furthermore, an RSU operating under this part is restricted to the location where it is licensed to operate. However, portable or hand-held RSUs are permitted to operate where they do not interfere with a site-licensed operation. An RSU broadcasts data to or exchanges data with OBUs.

Roadway bed surface. For DSRCS or the C-V2X Service, the road surface at ground level.

Subpart G—APPLICATIONS AND AUTHORIZATIONS

Section 90.149 is amended by revising paragraph (b) to read as follows:

§ 90.149 License term.

* * * * *

(b) Non-exclusive geographic area licenses for Roadside Units (RSUs) under subpart M of this part in the 5895-5925 MHz band will be issued for a term not to exceed ten years from the date of original issuance or renewal. The registration dates of individual RSUs (see § 90.375) will not change the overall renewal period of the single license.

Section 90.155 is amended by revising paragraph (i) to read as follows:

§ 90.155 Time in which station must be placed in operation.

* * * * *

(i) Roadside Units (RSUs) under subpart M of this part in the 5895-5925 MHz band must be placed in operation within 12 months from the effective date of registration (see § 90.375) or the authority to operate the RSUs cancels automatically (see § 1.955 of this chapter). Such registration date(s) do not change the overall renewal period of the single license. Licensees must notify the Commission in accordance with § 1.946 of this chapter when registered units are placed in operation within their construction period.

Subpart H—POLICIES GOVERNING THE ASSIGNMENT OF FREQUENCIES

Section 90.175 is amended by revising paragraph (j)(16) to read as follows:

§ 90.175 Frequency coordinator requirements.

* * * * *

(j) * * *

(16) Applications for DSRCS and C-V2X Service licenses (as well as registrations for Roadside Units) under subpart M of this part in the 5895-5925 GHz band.

* * * * *

Section 90.179 is amended by revising paragraph (f) to read as follows:

§ 90.179 Shared use of radio stations.

* * * * *

(f) Above 800 MHz, shared use on a for-profit private carrier basis is permitted only by SMR, Private Carrier Paging, LMS, DSCRS, and C-V2X Service licensees. See subparts M, P, and S of this part.

Subpart I—GENERAL TECHNICAL STANDARDS

Section 90.205 is amended by revising paragraph (q) to read as follows:

§ 90.205 Power and antenna height limits.

* * * * *

(q) 5895-5925 MHz. Power and height limitations are specified in subpart M of this part.

* * * * *

Section 90.210 is amended by revising the entry for 5850-5925 in the table and footnote 4 of the table to read as follows:

§ 90.210 Emission masks.

* * * * *

Applicable Emission Masks Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
* * * * *	* * * * *	* * * * *
5895-5925[4]		
* * * * *	* * * * *	* * * * *

[4] DSRCS and C-V2X Service Roadside Units in the 5.895-5.925 GHz band is governed under Subpart M of this part.

* * * * *

Section 90.213 is amended by revising footnote 10 of the table in paragraph (a) to read as follows:

§ 90.213 Frequency stability.

(a) ***

[10] Frequency stability for DSRCS and C-V2X Service equipment in the 5895-5925 MHz band is specified in subpart M of this part. For all other equipment, frequency stability is to be specified in the station authorization.

* * * * *

Subpart M—Intelligent Transportation Systems Radio Service

Section 90.350 is amended to read as follows:

§ 90.350 Scope.

The Intelligent Transportation Systems (ITS) radio service is for the purpose of integrating radio-based technologies into the nation's transportation infrastructure and to develop and implement the nation's intelligent transportation systems. It includes the Location and Monitoring Service (LMS), the Dedicated Short-Range Communications Service (DSRCS), and the Cellular Vehicle to Everything (C-V2X) Service. Rules as to eligibility for licensing, frequencies available, and any special requirements for services in the Intelligent Transportation Systems radio service are set forth in this subpart.

New section 90.370 is added to read as follows:

§ 90.370 Permitted frequencies.

(a) DSRCS Roadside Units (RSUs) are permitted to operate in the 5895-5905 MHz band.

(b) C-V2X Service RSUs are permitted to operate in the 5905-5925 MHz band.

(c) Channels are available on a shared basis only for use in accordance with the Commission's rules. All licensees shall cooperate in the selection and use of channels in order to reduce interference. This

includes monitoring for communications in progress and any other measures as may be necessary to minimize interference. Licensees of RSUs suffering or causing harmful interference within a communications zone as defined in section 90.375 of this part are expected to cooperate and resolve this problem by mutually satisfactory arrangements. If the licensees are unable to do so, the Commission may impose restrictions including specifying the transmitter power, antenna height and direction, additional filtering, or area or hours of operation of the stations concerned. Further the use of any channel at a given geographical location may be denied when, in the judgment of the Commission, its use at that location is not in the public interest; use of any such channel may be restricted as to specified geographical areas, maximum power, or such other operating conditions, contained in this part or in the station authorization.

Frequencies in the 5895-5925 MHz band will not be assigned for the exclusive use of any licensee.

The heading prior to section 90.371 is modified to read as follows and moved prior to newly added Section 90.370:

Regulations Governing the Licensing and Use of Frequencies in the 5895-5925 MHz Band for Dedicated Short-Range Communications Service (DSRCS) and Cellular Vehicle to Everything (C-V2X) Service.

Section 90.371 is amended by removing paragraph (a), redesignating paragraphs (b) and (c) as paragraphs (a) and (b) and revising the introductory text of newly redesignated paragraph (a) to read as follows:

§ 90.371 DSRCS and C-V2X Service.

(a) DSRCS and C-V2X Service Roadside Units (RSUs) operating in the band 5895-5925 MHz shall not receive protection from Government Radiolocation services in operation prior to the establishment of the RSU. Operation of RSU stations within 75 kilometers of the locations listed in the table below must be coordinated through the National Telecommunications and Information Administration.

* * * * *

Section 90.373 is amended by revising the introductory text to read as follows:

§ 90.373 Eligibility in the DSRCS and C-V2X Service.

The following entities are eligible to hold an authorization to operate Roadside units in the DSRCS or C-V2X Service:

* * * * *

Section 90.375 is revised to read as follows:

§ 90.375 License areas, communication zones, and registrations

(a) Roadside Units (RSUs) in the 5895-5925 MHz band are licensed on the basis of non-exclusive geographic areas. Governmental applicants will be issued a geographic area license based on the geo-political area encompassing the legal jurisdiction of the entity. All other applicants will be issued a geographic area license for their proposed area of operation based on county(s), state(s) or nationwide.

(b) Applicants who are approved in accordance with FCC Form 601 will be granted non-exclusive licenses for the channel(s) corresponding to their intended operations (see § 90.370). Such licenses serve as a prerequisite of registering individual RSUs located within the licensed geographic area described in

paragraph (a) of this section. Licensees must register each RSU in the Universal Licensing System (ULS) before operating such RSU. RSU registrations are subject, inter alia, to the requirements of § 1.923 of this chapter as applicable (antenna structure registration, environmental concerns, international coordination, and quiet zones). Additionally, RSUs at locations subject to NTIA coordination (see § 90.371(a)) may not begin operation until NTIA approval is received. Registrations are not effective until the Commission posts them on the ULS. It is the licensee's responsibility to delete from the registration database any RSUs that have been discontinued.

(c) Licensees must operate each RSU in accordance with the Commission's Rules and the registration data posted on the ULS for such RSU. Licensees must register each RSU for the smallest communication zone needed for the intelligent transportation systems application using one of the following four communication zones:

RSU class	Maximum output power (dBm)[1]	Communications zone (meters)
A	0	15
B	10	100
C	20	400
D	28.8	1000

[1] As described in the IEEE 802.11p-2010 and Standard and ATIS transposed standards of the 3GPP (incorporated by reference, *see* § 90.379).

Section 90.377 is revised to read as follows:

§ 90.377 Maximum EIRP and antenna height.

(a) DSRCS and C-V2X Service licensees shall transmit only the power (EIRP) needed to communicate with an On-Board Unit (OBU) within the communications zone and must take steps to limit the Roadside Unit (RSU) signal within the zone to the maximum extent practicable.

(b) DSRCS and C-V2X Service licensees must limit RSU output power to 20 dBm and equivalent isotopically radiated power (EIRP) to 33 dBm. The EIRP is measured as the maximum EIRP toward the horizon or horizontal, whichever is greater, of the gain associated with the main or center of the transmission beam.

(c) The radiation center of an RSU antenna shall not exceed 8 meters above the roadway bed surface, except that an RSU may employ an antenna with a height exceeding 8 meters but not exceeding 15 meters provided the EIRP specified in paragraphs (a) and (b) of this section is reduced by a factor of 20 log(Ht/8) in dB where Ht is the height of the radiation center of the antenna in meters above the roadway bed surface. The RSU antenna height shall not exceed 15 meters above the roadway bed surface.

Section 90.379 is revised to read as follows:

§ 90.379 Technical standards for Roadside Units

(a) DSRCS Roadside Units (RSUs) operating in the 5895-5905 MHz band must comply with the technical standard Institute of Electrical and Electronics Engineers (IEEE) 802.11p-2010.

(b) C-V2X Service RSUs operating in the 5905-5925 MHz band shall comply with the V2X sidelink service for this band as described in the ATIS transposed standards of the 3GPP specifications except where these rules and regulations take precedence.

(c) The standards required in this section are incorporated by reference into this section with the approval of the Director of the Federal Register under 5 U.S.C. § 552(a) and 1 CFR part 51. All approved material is available for inspection at the Federal Communications Commission, 445 12th Street SW., Washington, D.C. 20554 and is available from the sources indicated below. It is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030 or go to www.archives.gov/federal-register/cfr/ibrlocations.html.

(1) 802.11p-2010, IEEE Standard for Information technology– Local and metropolitan area networks – Specific requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Amendment 6: Wireless Access in Vehicular Environments (2010). This standard is available from the Institute of Electrical and Electronics Engineers (IEEE), 3025 Boardwalk Drive, Suite 220, Ann Arbor, MI 48108, 1-855-999-9870, http://www.techstreet.com/ieee.

(2) 3GPP Release 14, 3rd Generation Partnership Project Technical Specification Group Services and System Aspects (2018). This standard is available from ATIS, 1200 G Street NW Suite 500, Washington, D.C. 20005, https://www.atis.org/docstore/default.aspx.

Section 90.381 is added to read as follows:

§ 90.381 C-V2X Service emissions limits.

C-V2X Service Roadside Units (RSUs) must comply with the following out-of-band emissions limits:

(a) Conducted limits measured at the antenna input shall not exceed:
(1) -29 dBm/100 kHz at the band edge (The band is defined in section 90.370 of this part);
(2) -35 dBm/100 kHz ± 1 megahertz from the band edge;
(3) -43 dBm/100 kHz ± 10 megahertz from the band edge; and
(4) -53 dBm/100 kHz ± 20 megahertz from the band edge.

(b) Radiated limits: All C-V2X Service RSUs must limit radiated emissions to -25 dBm/100 kHz EIRP or less outside the band edges where the band is defined in section 90.370 of this part.

Section 90.383 is amended by revising the introductory text and paragraph (c) to read as follows:

§ 90.383 RSU sites near the U.S./Canada or U.S./Mexico border.

Until such time as agreements between the United States and Canada or the United States and Mexico, as applicable, become effective governing border area use of the 5850-5925 MHz band, authorizations to operate Roadside Units (RSUs) are granted subject to the following conditions:

* * * * *

(b) Authority to operate RSUs is subject to modifications and future agreements between the United States and Canada or the United States and Mexico, as applicable.

Subpart N—OPERATING REQUIREMENTS

Section 90.415 is revised by amending paragraph (b) to read as follows:

* * * * *

(b) Render a communications common carrier service, except for stations in the Public Safety Pool providing communications standby facilities under § 90.20(a)(2)(xi) and stations licensed under this part in the SMR, private carrier paging, Industrial/Business Pool, 220-222 MHz or the DSRCS and C-V2X Service.

Section 90.421 is revised by adding paragraph (d) to read as follows:

§ 90.421 Operation of mobile station units not under the control of the licensee.

* * * * *

(d) DSRCS and C-V2X Service On-Board Units licensed by rule under part 95 of this chapter may communicate with any roadside unit authorized under this part or any licensed commercial mobile radio service station as defined in part 20 of this chapter.

Section 90.425 is revised by amending paragraph (d)(10) to read as follows:

§ 90.425 Station identification.

* * * * *

(d) * * *

(10) It is a Roadside Unit (RSU) in an ITS system.

Part 95 -Personal Radio Services

The authority citation for Part 95 continues to read as follows:

Authority: 47 U.S.C. 154, 303, and 307.

The subtitle for subpart L is revised to read as follows:

Subpart L—DSRCS and C-V2X Service On-Board Units

Section 95.3101 is amended to read as follows:

§ 95.3101 Scope.

This subpart contains rules that apply only to On-Board Units (OBUs) transmitting in the 5895-5925 MHz frequency band in the Dedicated Short-Range Communications Services (DSRCS) and the Cellular Vehicle to Everything (C-V2X) Service (see § 90.371 of this chapter).

Section 95.3103 is amended by adding a definition for Cellular Vehicle to Everything (C-V2X) Service in alphabetical order and revising the definition of On-Board Unit (OBU) to read as follows:

§ 95.3103 Definitions, OBUs.

Cellular Vehicle to Everything (C-V2X) Service. A service providing for data transfer between various mobile and roadside transmitting units for the purposes of improving traffic flow, highway safety and performing other intelligent transportation functions. See § 90.7 of this chapter for a more detailed definition.

* * * * *

On-Board Units (OBUs). OBUs are low-power devices on vehicles that transfer data to roadside units or other OBUs in the Dedicated Short-Range Communications Service or the Cellular Vehicle to Everything (C-V2X) Service (see §§ 90.370-90.383 of this chapter), to improve traffic flow and safety, and for other intelligent transportation system purposes. See § 90.7 of this chapter.

* * * * *

Section 95.3131 is revised to read as follows:

§ 95.3131 Permissible uses, OBUs.

On-Board Units (OBUs) may transmit signals to other OBUs and to Roadside Units (RSUs), which are authorized under part 90 of this chapter or to licensees as defined in part 20 of this chapter.

Section 95.3159 is removed.

Section 95.3161 is amended by revising paragraph (a) to read as follows:

§ 95.3161 OBU transmitter certification.

(a) Each On-Board Unit (OBU) C-V2XC-V2Xthat operates or is intended to operate in the DSRCS or C-V2X Service must be certified in accordance with this subpart and subpart J of part 2 of this chapter.

* * * * *

Section 95.3163 is revised to read as follows:

§ 95.3163 OBU frequencies.

(a) DSRCS On-Board Units (OBUs) are permitted to operate in the 5895-5905 MHz band.

(b) C-V2X Service OBUs are permitted to operate in the 5905-5925 MHz band.

Section 95.3167 is revised to read as follows:

§ 95.3167 OBU transmit power limit.

(a) The maximum output power for portable DSRCS On-Board Unit (OBU) transmitter types is 1.0 mW.

(b) The maximum output power for vehicular and portable C-V2X Service OBU transmitter types is 20 dBm and the maximum equivalent isotopically radiated power (EIRP) is limited to 23 dBm.

(c) The power limits in paragraphs (a) and (b) of this section may be referenced to the antenna input, so that cable losses are taken into account.

(d) For purposes of this section, a portable unit is a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

Section 95.3179 is added to read as follows:

§ 95.3179 Unwanted emissions limits.

(a) C-V2X Service Roadside Units must comply with the following out-of-band emissions limits:

(1) Conducted limits measured at the antenna input shall not exceed:
(i) -29 dBm/100 kHz at the band edge (The band is defined in section 95.3163 of this part.);
(ii) -35 dBm/100 kHz ± 1 megahertz from the band edge;
(iii) -43 dBm/100 kHz ± 10 megahertz from the band edge; and
(iv) -53 dBm/100 kHz ± 20 megahertz from the band edge.

(2) Radiated limits: All C-V2X Service On-Board Units must limit radiated emissions to -25 dBm/100 kHz EIRP or less outside the band edges where the band is defined in section 95.3163 of this part.

(b) DSRCS out-of-band emissions limits are specified in the IEEE 802.11p-2010 standard (See section 95.3189 of this part)

Section 95.3189 is amended to read as follows:

§ 95.3189 OBU technical standard.

(a) DSRCS On-Board Unit (OBU) transmitter types operating in the 5895-5905 MHz band must be designed to comply with the technical standard Institute of Electrical and Electronics Engineers (IEEE) 802.11p-2010.

(b) C-V2X Service OBU transmitter types operating in the 5895-5925 MHz band shall comply with the V2X sidelink service for this band as described in the ATIS transposed standards of the 3GPP specifications except where these rules and regulations take precedence.

(c) The standards required in this section are incorporated by reference into this section with the approval of the Director of the Federal Register under 5 U.S.C. § 552(a) and 1 CFR part 51. All approved material is available for inspection at the Federal Communications Commission, 445 12th Street SW., Washington, D.C. 20554 and is available from the sources indicated below. It is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030 or go to www.archives.gov/federal-register/cfr/ibrlocations.html.

(1) 802.11p-2010, IEEE Standard for Information technology – Local and metropolitan area networks – Specific requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Amendment 6: Wireless Access in Vehicular Environments (2010). This standard is available from the Institute of Electrical and Electronics Engineers

(IEEE), 3025 Boardwalk Drive, Suite 220, Ann Arbor, MI 48108, 1-855-999-9870, http://www.techstreet.com/ieee.

(2) 3GPP Release 14, 3rd Generation Partnership Project Technical Specification Group Services and System Aspects (2018). This standard is available from ATIS, 1200 G Street NW Suite 500, Washington, D.C. 20005, https://www.atis.org/docstore/default.aspx.

Appendix A to part 95 is amended by removing the entry in the table for "95.1509 - ASTM E2213-03 DSRC Standard."

Appendix C

Initial Regulatory Flexibility Analysis

As required by the Regulatory Flexibility Act of 1980, as amended (RFA),[1] the Commission has prepared this present Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in this Notice of Proposed Rule Making (NPRM). Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the NPRM provided in the item. The Commission will send a copy of the NPRM, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).[2] In addition, the NPRM and IRFA (or summaries thereof) will be published in the Federal Register.[3]

A. Need for, and Objectives of, the Proposed Rules

1. In this Notice of Proposed Rulemaking, we assess the present 5.9 GHz band (5.850-5.925 GHz band) rules and propose appropriate changes to ensure the spectrum supports its highest and best use. Recognizing the current state of vehicular technology and deployment, and the evolution of the telecommunications market, we propose to continue to dedicate spectrum—the upper 30 megahertz portion of the band—for transportation and vehicle safety purposes and repurposing the lower 45 megahertz part of the band for unlicensed operations to support high-throughput broadband applications.

2. For the past two decades, the 5.9 GHz band has been spectrum designated for the operation of the Intelligent Transportation System (ITS). The Commission adopted licensing and services rules for Dedicated Short Range Communications (DSRC), and specified a single technological standard based on its expectation that, despite its general preference for leaving the selection of technologies to licensees, a single standard in this band was most likely to promote interoperability between vehicles and infrastructure in the United States, enable robust automotive safety communications, and accelerate the nationwide deployment of DSRC-based applications while reducing costs.

3. Since that time, the DSRC service has evolved slowly and has not been widely deployed within the consumer automobile market (it has found use in certain specialized, traffic-related projects). Meanwhile, numerous technologies have been or are being developed and deployed to improve transportation safety and efficiency and provide the types of services envisioned for DSRC in spectrum outside the 5.9 GHz band. A new technology, Cellular Vehicle to Everything (C V2X), has been gaining momentum as a means of providing transportation and vehicle safety-related communications, and its proponents now seek to operate its technology as an ITS service in the 5.9 GHz band. At the same time, unlicensed device use has developed exponentially elsewhere in the 5 GHz band to become a vital component of the communications landscape. As a result, most of the spectrum between 5.150 GHz to the lower edge of the 5.9 GHz band at 5.850 GHz is available for unlicensed operations. As such, the 5.850-5.895 GHz sub-band in the 5.9 GHz band is especially well positioned to deliver immediate and potentially significant benefits when used by unlicensed devices to meet the intense demand.

4. This Notice propose to create sub-bands within the 5.9 GHz band to allow unlicensed operations to operate in the lower 45 megahertz of the band (5.850-5.895 GHz) and reserve the upper 30 megahertz of the band (5.895-5.925 GHz) for ITS, either solely C-V2X or divided between C-V2X and DSRC technologies. This 45/30 megahertz split for unlicensed devices and ITS applications is intended

[1] *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. § 601–612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

[2] *See* 5 U.S.C. § 603(a).

[3] *See* 5 U.S.C. § 603(a).

to optimize the use of spectrum resources in the 5.9 GHz band by enabling valuable additions and enhancements to the unlicensed ecosystem and by continuing to dedicate sufficient spectrum to meet current and future ITS needs within the vehicular-related ecosystem. This proposal seeks to provide the spectrum necessary for unlicensed operations to implement the widest, highest throughput channel permitted by the standards, while clarifying the technical rules and eliminating uncertainty for the development and deployment of ITS applications.

B. Legal Basis

5. The proposed action is taken authority found in Sections 1, 4(i), 301, 302, 303, 316, and 332 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 154(i), 301, 302, 303, 316, and 332, and Section 1.411 of the Commission's Rules, 47 CFR § 1.411.

C. Description and Estimate of the Number of Small Entities to Which the Proposed Rules Will Apply

6. The RFA directs agencies to provide a description of, and where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.[4] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."[5] In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.[6] A "small business concern" is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).[7]

7. *Small Businesses, Small Organizations, Small Governmental Jurisdictions.* Our actions, over time, may affect small entities that are not easily categorized at present. We therefore describe here, at the outset, three broad groups of small entities that could be directly affected herein.[8] First, while there are industry specific size standards for small businesses that are used in the regulatory flexibility analysis, according to data from the SBA's Office of Advocacy, in general a small business is an independent business having fewer than 500 employees.[9] These types of small businesses represent 99.9% of all businesses in the United States which translates to 28.8 million businesses.[10]

8. Next, the type of small entity described as a "small organization" is generally "any not-for-profit enterprise which is independently owned and operated and is not dominant in its field."[11]

---

[4] *See* 5 U.S.C. § 603(b)(3).

[5] 5 U.S.C. § 601(6).

[6] 5 U.S.C. § 601(3) (incorporating by reference the definition of "small-business concern" in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register."

[7] 15 U.S.C. § 632.

[8] *See* 5 U.S.C. § 601(3)-(6).

[9] *See* SBA, Office of Advocacy, "Frequently Asked Questions, Question 1 – What is a small business?" https://www.sba.gov/sites/default/files/advocacy/SB-FAQ-2016_WEB.pdf (June 2016).

[10] *See* SBA, Office of Advocacy, "Frequently Asked Questions, Question 2- How many small businesses are there in the U.S.?" https://www.sba.gov/sites/default/files/advocacy/SB-FAQ-2016_WEB.pdf (June 2016).

[11] 5 U.S.C. § 601(4).

Nationwide, as of August 2016, there were approximately 356,494 small organizations based on registration and tax data filed by nonprofits with the Internal Revenue Service (IRS).[12]

9. Finally, the small entity described as a "small governmental jurisdiction" is defined generally as "governments of cities, counties, towns, townships, villages, school districts, or special districts, with a population of less than fifty thousand."[13] U.S. Census Bureau data from the 2012 Census of Governments[14] indicate that there were 90,056 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States.[15] Of this number there were 37, 132 General purpose governments (county[16], municipal and town or township[17]) with populations of less than 50,000 and 12,184 Special purpose governments (independent school districts[18] and special districts[19]) with populations of less than 50,000. The 2012 U.S. Census Bureau data for most types of governments in the local government category show that the majority of these governments have populations of less than 50,000.[20] Based on this data we estimate that at least 49,316 local government jurisdictions fall in the category of "small governmental jurisdictions."[21]

---

[12] Data from the Urban Institute, National Center for Charitable Statistics (NCCS) reporting on nonprofit organizations registered with the IRS was used to estimate the number of small organizations. Reports generated using the NCCS online database indicated that as of August 2016 there were 356,494 registered nonprofits with total revenues of less than $100,000. Of this number, 326,897 entities filed tax returns with 65,113 registered nonprofits reporting total revenues of $50,000 or less on the IRS Form 990-N for Small Exempt Organizations and 261,784 nonprofits reporting total revenues of $100,000 or less on some other version of the IRS Form 990 within 24 months of the August 2016 data release date. *See* http://nccs.urban.org/sites/all/nccs-archive/html//tablewiz/tw.php where the report showing this data can be generated by selecting the following data fields: Report: "The Number and Finances of All Registered 501(c) Nonprofits"; Show: "Registered Nonprofits"; By: "Total Revenue Level (years 1995, Aug to 2016, Aug)"; and For: "2016, Aug" then selecting "Show Results".

[13] 5 U.S.C. § 601(5).

[14] *See* 13 U.S.C. § 161. The Census of Government is conducted every five (5) years compiling data for years ending with "2" and "7". *See also* Program Description Census of Government *https://factfinder.census.gov/faces/affhelp/jsf/pages/metadata.xhtml?lang=en&type=program&id=program.en.COG#*.

[15] *See* U.S. Census Bureau, 2012 Census of Governments, Local Governments by Type and State: 2012 - United States – States. https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG02.US01. Local governmental jurisdictions are classified in two categories - General purpose governments (county, municipal and town or township) and Special purpose governments (special districts and independent school districts).

[16] *See* U.S. Census Bureau, 2012 Census of Governments, County Governments by Population-Size Group and State: 2012 - United States – States. https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG06.US01. There were 2,114 county governments with populations less than 50,000.

[17] *See* U.S. Census Bureau, 2012 Census of Governments, Subcounty General-Purpose Governments by Population-Size Group and State: 2012 - United States – States. https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG07.US01. There were 18,811 municipal and 16,207 town and township governments with populations less than 50,000.

[18] *See* U.S. Census Bureau, 2012 Census of Governments, Elementary and Secondary School Systems by Enrollment-Size Group and State: 2012 - United States – States. https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG11.US01. There were 12,184 independent school districts with enrollment populations less than 50,000.

[19] *See* U.S. Census Bureau, 2012 Census of Governments, Special District Governments by Function and State: 2012 - United States – States. https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG09.US01. The U.S. Census Bureau data did not provide a population breakout for special district governments.

[20] *See* U.S. Census Bureau, 2012 Census of Governments, County Governments by Population-Size Group and State: 2012 - United States – States. https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG06.US01; Subcounty General-Purpose Governments by Population-Size Group and State: 2012 - United States – States.

(continued….)

10. *Radio Frequency Equipment Manufacturers (RF Manufacturers).* Neither the Commission nor the SBA has developed a small business size standard applicable to Radio Frequency Equipment Manufacturers (RF Manufacturers). There are several analogous SBA small entity categories applicable to RF Manufacturers - Fixed Microwave Services, Other Communications Equipment Manufacturing, and Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing. A description of these small entity categories and the small business size standards under the SBA rules are detailed below.

11. *Fixed Microwave Services.* Microwave services include common carrier,[22] private-operational fixed,[23] and broadcast auxiliary radio services.[24] They also include the Upper Microwave Flexible Use Service[25], Millimeter Wave Service[26], Local Multipoint Distribution Service (LMDS),[27] the Digital Electronic Message Service (DEMS),[28] and the 24 GHz Service,[29] where licensees can choose between common carrier and non-common carrier status.[30] There are approximately 66,680 common carrier fixed licensees, 69,360 private and public safety operational-fixed licensees, 20,150 broadcast auxiliary radio licensees, 411 LMDS licenses, 33 24 GHz DEMS licenses, 777 39 GHz licenses, and five 24 GHz licenses, and 467 Millimeter Wave licenses in the microwave services.[31] The Commission has not yet defined a small business with respect to microwave services. The closest applicable SBA category is Wireless Telecommunications Carriers (except Satellite) and the appropriate size standard for this category under SBA rules is that such a business is small if it has 1,500 or fewer employees.[32] For this industry, U.S. Census Bureau data for 2012 show that there were 967 firms that operated for the entire year.[33] Of this total, 955 firms had employment of 999 or fewer employees and 12 had employment

(Continued from previous page)
https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG07.US01; and Elementary and Secondary School Systems by Enrollment-Size Group and State: 2012 - United States – States. https://factfinder.census.gov/bkmk/table/1.0/en/COG/2012/ORG11.US01. While U.S. Census Bureau data did not provide a population breakout for special district governments, if the population of less than 50,000 for this category of local government is consistent with the other types of local governments the majority of the 38,266 special district governments have populations of less than 50,000.

[21] *Id.*

[22] *See* 47 CFR Part 101, Subparts C and I.

[23] *See* 47 CFR Part 101, Subparts C and H.

[24] Auxiliary Microwave Service is governed by Part 74 of Title 47 of the Commission's Rules. *See* 47 CFR Part 74. Available to licensees of broadcast stations and to broadcast and cable network entities, broadcast auxiliary microwave stations are used for relaying broadcast television signals from the studio to the transmitter, or between two points such as a main studio and an auxiliary studio. The service also includes mobile TV pickups, which relay signals from a remote location back to the studio.

[25] *See* 47 CFR Part 30.

[26] *See* 47 CFR Part 101, Subpart Q.

[27] *See* 47 CFR Part 101, Subpart L.

[28] *See* 47 CFR Part 101, Subpart G.

[29] *See id.*

[30] *See* 47 CFR §§ 101.533, 101.1017.

[31] These statistics are based on a review of the Universal Licensing System on September 22, 2015.

[32] *See* 13 CFR § 121.201, NAICS code 517312 (previously 517210).

[33] U.S. Census Bureau, *2012 Economic Census of the United States*, Table EC1251SSSZ5, Information: Subject Series, "Estab and Firm Size: Employment Size of Firms for the U.S.: 2012 NAICS Code 517210" (rel. Jan. 8, 2016). https://factfinder.census.gov/bkmk/table/1.0/en/ECN/2012_US/51SSSZ5//naics~517210.

of 1000 employees or more.[34] Thus under this SBA category and the associated size standard, the Commission estimates that a majority of fixed microwave service licensees can be considered small.

12. *Other Communications Equipment Manufacturing*. This industry comprises establishments primarily engaged in manufacturing communications equipment (except telephone apparatus, and radio and television broadcast, and wireless communications equipment).[35] Examples of such manufacturing include fire detection and alarm systems manufacturing, Intercom systems and equipment manufacturing, and signals (e.g., highway, pedestrian, railway, traffic) manufacturing.[36] The SBA has established a size standard for this industry as all such firms having 750 or fewer employees.[37] U.S. Census Bureau data for 2012 shows that 383 establishments operated in that year.[38] Of that number, 379 operated with fewer than 500 employees and 4 had 500 to 999 employees.[39] Based on this data, we conclude that the majority of Other Communications Equipment Manufacturers are small.

13. *Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing*. This industry comprises establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment.[40] Examples of products made by these establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment.[41] The SBA has established a small business size standard for this industry of 1,250 or fewer employees.[42] U.S. Census Bureau data for 2012 show that 841 establishments operated in this industry in that year.[43] Of that number, 828 establishments operated with fewer than 1,000 employees, 7 establishments operated with between 1,000 and 2,499 employees and 6 establishments operated with 2,500 or more employees.[44] Based on this data, we conclude that a majority of manufacturers in this industry are small.

14. *Automobile Manufacturing.* This U.S. industry comprises establishments primarily engaged in (1) manufacturing complete automobiles (i.e., body and chassis or unibody) or (2)

---

[34] *Id*. Available census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with "1000 employees or more."

[35] *See* U.S. Census Bureau, 2017 NAICS Definitions, NAICS Code "334290 Other Communications Equipment Manufacturing", https://www.census.gov/cgi-bin/sssd/naics/naicsrch?input=334290&search=2017+NAICS+Search&search=2017.

[36] *Id.*

[37] See 13 CFR 121.201, NAICS Code 334290.

[38] U.S. Census Bureau, *2012 Economic Census of the United States*, Table EC1231SG2, Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2012, NAICS Code 334290, https://factfinder.census.gov/bkmk/table/1.0/en/ECN/2012_US/31SG2//naics~334290.

[39] *Id.*

[40] *See* U.S. Census Bureau, 2012 NAICS Definitions, "334220 Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing" *https://factfinder.census.gov/faces/affhelp/jsf/pages/metadata.xhtml?lang=en&type=ib&id=ib.en./ECN.NAICS2012.334220#*.

[41] *Id*.

[42] 13 CFR § 121.201, NAICS Code 334220.

[43] U.S. Census Bureau, *2012 Economic Census of the United States*, Table EC1231SG2, Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2012, NAICS Code 334220, https://factfinder.census.gov/bkmk/table/1.0/en/ECN/2012_US/31SG2//naics~334220.

[44] *Id*.

manufacturing automobile chassis only.[45] The SBA has established a size standard for this industry, which is 1,500 or fewer employees.[46] 2012 U.S. Census Bureau data indicate that 185 establishments operated in this industry that year.[47] Of this number, 162 establishments had employment of fewer than 1,000 employees, and 11 establishments had employment of 1,000 to 2,499 employees.[48] Therefore, the Commission estimates that the majority of manufacturers in this industry are small entities.

15. *Internet Service Providers (Non-Broadband).* Internet access service providers such as Dial-up Internet service providers, VoIP service providers using client-supplied telecommunications connections and Internet service providers using client-supplied telecommunications connections (e.g., dial-up ISPs) fall in the category of All Other Telecommunications.[49] The SBA has developed a small business size standard for All Other Telecommunications which consists of all such firms with gross annual receipts of $35 million or less.[50] For this category, U.S. Census Bureau data for 2012 show that there were 1,442 firms that operated for the entire year.[51] Of these firms, a total of 1,400 had gross annual receipts of less than $25 million.[52] Consequently, under this size standard a majority of firms in this industry firms can be considered small.

16. *Internet Service Providers (Broadband).* Broadband Internet service providers include wired (e.g., cable, DSL) and VoIP service providers using their own operated wired telecommunications infrastructure fall in the category of Wired Telecommunication Carriers.[53] Wired Telecommunications Carriers are comprised of establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired telecommunications networks. Transmission facilities may be based on a single technology or a combination of technologies.[54] The SBA size standard for this category classifies a business as small if it has 1,500 or fewer employees.[55] U.S. Census Bureau data for 2012 show that there were 3,117 firms that operated that year.[56] Of this total, 3,083 operated with fewer than

[45] See U.S. Census Bureau, 2012 NAICS Definitions, NAICS Code 336111 "Automotive Manufacturing", https://factfinder.census.gov/faces/affhelp/jsf/pages/metadata.xhtml?lang=en&type=ib&id=ib.en./ECN.NAICS2012.336111#.

[46] 13 CFR § 121.201, NAICS Code 336111.

[47] U.S. Census Bureau, *2012 Economic Census of the United States*, Table EC1231SG2, *Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size*: 2012, NAICS Code 336111, https://factfinder.census.gov/bkmk/table/1.0/en/ECN/2012_US/31SG2//naics~336111.

[48] *Id*. Available U.S. Census data does not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees.

[49] *See* U.S. Census Bureau, 2017 NAICS Definitions, NAICS Code "517919 All Other Telecommunications", https://www.census.gov/cgi-bin/sssd/naics/naicsrch?input=517919&search=2017+NAICS+Search&search=2017.

[50] 13 CFR § 121.201; NAICS Code 517919.

[51] U.S. Census Bureau, *2012 Economic Census of the United States*, Table EC1251SSSZ4, Information: Subject Series - Estab and Firm Size: Receipts Size of Firms for the United States: 2012, NAICS code 517919, https://factfinder.census.gov/bkmk/table/1.0/en/ECN/2012_US/51SSSZ4//naics~517919.

[52] *Id*.

[53] *See* 13 CFR § 121.201. The Wired Telecommunications Carrier category formerly used the NAICS code of 517110. As of 2017 the U.S. Census Bureau definition show the NAICs code as 517311. *See* https://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517311&search=2017.

[54] *Id.*

[55] *Id.*

[56] *See* U.S. Census Bureau, *2012 Economic Census of the United States,* Table No. EC1251SSSZ5, *Information: Subject Series - Estab & Firm Size: Employment Size of Firms:* 2012 NAICS Code 517110 https://factfinder.census.gov/bkmk/table/1.0/en/ECN/2012_US/51SSSZ5//naics~517110.

1,000 employees.[57] Consequently, under this size standard the majority of firms in this industry can be considered small.

17. *Cable System Operators (Telecom Act Standard).* The Communications Act of 1934, as amended also contains a size standard for small cable system operators, which is "a cable operator that, directly or through an affiliate, serves in the aggregate fewer than one percent of all subscribers in the United States and is not affiliated with any entity or entities whose gross annual revenues in the aggregate exceed $250,000,000."[58] As of 2018, there were approximately 50,504,624 cable video subscribers in the United States.[59] Accordingly, an operator serving fewer than 505,046 subscribers shall be deemed a small operator if its annual revenues, when combined with the total annual revenues of all its affiliates, do not exceed $250 million in the aggregate.[60] Based on available data, we find that all but six incumbent cable operators are small entities under this size standard.[61] We note that the Commission neither requests nor collects information on whether cable system operators are affiliated with entities whose gross annual revenues exceed $250 million.[62] Therefore we are unable at this time to estimate with greater precision the number of cable system operators that would qualify as small cable operators under the definition in the Communications Act.

18. *Wireless Telecommunications Carriers (except Satellite).* This industry comprises establishments engaged in operating and maintaining switching and transmission facilities to provide communications via the airwaves. Establishments in this industry have spectrum licenses and provide services using that spectrum, such as cellular services, paging services, wireless internet access, and wireless video services.[63] The appropriate size standard under SBA rules is that such a business is small if it has 1,500 or fewer employees.[64] For this industry, U.S. Census Bureau data for 2012 show that there were 967 firms that operated for the entire year.[65] Of this total, 955 firms had employment of 999 or fewer employees and 12 had employment of 1000 employees or more.[66] Thus under this category and the associated size standard, the Commission estimates that the majority of wireless telecommunications carriers (except satellite) are small entities.

---

[57] *Id.*

[58] 47 CFR § 76.90(f) and notes ff. 1, 2, and 3.

[59] S&P Global Market Intelligence, U.S. Cable Subscriber Highlights, Basic Subscribers(actual) 2018, U.S. Cable MSO Industry Total.

[60] 47 CFR § 76.901(f) and notes ff. 1, 2, and 3.

[61] S&P Global -Market Intelligence, Top Cable MSOs 12/18Q. The six cable operators all had more than 505,046 basic cable subscribers.

[62] The Commission receives such information on a case-by-case basis if a cable operator appeals a local franchise authority's finding that the operator does not qualify as a small cable operator pursuant to section 76.901(f) of the Commission's rules. *See* 47 CFR § 76.901(f).

[63] U.S. Census Bureau, 2012 NAICS Definitions, "517210 Wireless Telecommunications Carriers (Except Satellite)," *See* https://factfinder.census.gov/faces/affhelp/jsf/pages/metadata.xhtml?lang=en&type=ib&id=ib.en./ECN.NAICS2012.517210.

[64] 13 CFR § 121.201, NAICS code 517312 (previously 517210).

[65] U.S. Census Bureau, *2012 Economic Census of the United States*, Table EC1251SSSZ5, Information: Subject Series: Estab and Firm Size: Employment Size of Firms for the U.S.: 2012 NAICS Code 517210. https://factfinder.census.gov/bkmk/table/1.0/en/ECN/2012_US/51SSSZ5//naics~517210.

[66] *Id*. Available census data does not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with "1000 employees or more."

D. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements for Small Entities

19. The NPRM proposes rules that will affect reporting and other compliance requirements.

20. The NPRM proposes to adopt rules reducing the amount of spectrum available for vehicular-related communications, i.e., ITS, from 75 megahertz (5.850-5.925 GHz) to 30 megahertz (5.895-5.925 GHz) and establish rules for the C-V2X technology that largely follow the Commission's approach when the rules for DSRC operations were adopted, including those designed to protect incumbent operations. We expect that manufacturers would be required to redesign DSRC equipment to reflect the revised band plan (if DSRC remains a technical option in the band) and design C-2X equipment to per the Commission's new rules. We also propose that a licensee of either technology must register each of its roadside units in the Universal Licensing System before operating such roadside unit and delete from the registration database any roadside units that have been discontinued.

21. The NPRM also proposes to allow unlicensed operations in 45 megahertz from 5.850-5.895 GHz (the U-NII-4 band) under the conditions of not causing harmful interference and accepted any interference from an authorize radio station. We propose that U-NII-4 devices be subject to similar technical and operational rules that apply to the U-NII-3 band, with regard to, e.g., power levels and out-of-band emissions limits. Because the proposed U-NII-4 band at 5.850-5.895 GHz is located immediately adjacent to the existing U-NII-3 band at 5.725-5.850 GHz, we expect that manufacturers will design devices that span the U-NII-3 and U-NII-4 bands to implement the widest channel available under the standards, which will affect device design and cost.

E. Steps Taken to Minimize the Significant Economic Impact on Small Entities, and Significant Alternatives Considered

22. The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.[67]

23. The proposals that would require equipment modification or new equipment manufacturing would have an impact on equipment manufacturers, some of which may be small entities. Though we believe that our proposed technical rules for the ITS equipment would provide appropriate rules for this band, we seek comment on alternatives that are based on the existing rules or some other regulatory scheme, with regard to, e.g., power limits and antenna height. We also seek comment on whether we should adopt different power levels or alternative out-of-band emissions limits for U-NII-4 equipment as compared to other U-NII equipment.

24. In addition, we seek general comment on alternative approaches to the spectrum band plan that those discussed, such as creating differently sized sub-bands for unlicensed and ITS, and technology neutral approaches to use of the ITS band,

25. The regulatory burdens we have proposed are necessary in order to ensure that the public receives the benefits of innovative services and technologies in a prompt and efficient manner and apply equally to large and small entities, thus without differential impact. Comments with proposed alternatives will assist in reaching the best outcomes. We will continue to examine alternatives in the future with the objectives of eliminating unnecessary regulations and minimizing any significant impact on small entities.

[67] *See* 5 U.S.C. § 603(c).

F. Federal Rules that May Duplicate, Overlap, or Conflict with the Proposed Rules

None.

STATEMENT OF
CHAIRMAN AJIT PAI

Re: *Use of the 5.850-5.925 GHz Band*, ET Docket No. 19-308.

Exactly 20 years ago, the Commission allocated 75 megahertz of spectrum in the 5.9 GHz band for a technology called Dedicated Short-Range Communications, or DSRC. DSRC was designed to facilitate motor vehicle-related communications. But unfortunately, it's never been widely deployed. And in the meantime, a wave of new transportation communication technologies has emerged, as has demand for unlicensed spectrum. As a result, a lot of people are wondering whether this valuable spectrum—a public resource—is really being put to its best use. In my view, it is not.

After two decades of dormancy, the 5.9 GHz band deserves a fresh look by the FCC. And that's exactly what we are doing. In this Notice, we tee up a balanced proposal that will advance both unlicensed wireless innovation and automotive safety technologies.

The reason we're focusing in part on unlicensed operations is simple. Today, Wi-Fi is a staple of everyday life. It is the fabric that binds together all our devices. It has become a foundational technology for the Internet of Things, connecting virtually any device or appliance you can think of. Wi-Fi currently carries more than half of the Internet's traffic, and that share will only grow in the future. The next generation of Wi-Fi, Wi-Fi 6, is being rolled out this year and will provide better connections to multiple devices and better performance in congested environments. The economic value created by Wi-Fi in the United States is projected to double by 2023—reaching nearly $1 trillion.

To fully realize Wi-Fi's potential, we need to make more spectrum available for unlicensed use. And that's just what the FCC is doing. In March, for example, we made over 21 gigahertz of spectrum above 95 GHz available for use by unlicensed devices. And we are working hard to free up spectrum in the 6 GHz band—what could be a massive, 1,200-megahertz test bed for innovators and innovation.

But here, we're proposing to designate the lower 45 megahertz of the 5.9 GHz band exclusively for unlicensed uses like Wi-Fi. The adjacent 5.725-to-5.850 GHz band is currently available for unlicensed operations, making this 45 MHz sub-band ideally suited for unlicensed use. Having more contiguous spectrum here is essential for the larger channels needed to support innovative use cases.

Another part of our proposal advances the cause of automotive safety. Specifically, we're proposing to reserve the remaining 30 megahertz of spectrum in the 5.9 GHz band exclusively for transportation-related communications technologies. This is consistent with our longstanding support for automotive safety during my tenure. Back in 2017, we ensured there would be a large swath of contiguous spectrum in the 76-to-81 GHz band exclusively for vehicular radars. These radars have proved especially useful for emergency braking and adaptive cruise control.

One promising new technology that is gaining momentum in the automotive industry is Cellular Vehicle to Everything, or C-V2X. C-V2X would use standard cellular protocols to provide direct communications between vehicles, and, as the name suggests, everything—including other vehicles on the road, infrastructure (like light poles), cyclists (like me), pedestrians, and road workers. C-V2X also is expected to support new, advanced applications as we transition to faster, more responsive 5G networks. And it's backed by automakers like Ford, Audi, BMW, Daimler, and Tesla. So we're proposing to designate the upper 20 MHz for this exciting, new automotive communications technology. This would be a significant step forward for automotive safety since there is currently *no* spectrum allocated for C-V2X. As Ford's CEO, James Hackett wrote to us, "[e]xtensive testing has shown that CV2X will give people the ability to move more safely and freely than ever before . . . Without this proceeding, CV2X cannot be deployed."

And we're not closing the door on DSRC. Japan has a single 10-megahertz channel for DSRC that's actively used for collision avoidance. In the Notice, we seek comment on whether to designate the

remaining 10 megahertz of spectrum in the upper part of the 5.9 GHz band for DSRC or C-V2X. I encourage advocates of each technology to make their cases.

This balanced approach—dedicating 45 megahertz of the 5.9 GHz band for more unlicensed innovation and 30 megahertz for automotive safety—maximizes the value of the band for the American people. And it would do far more for both automotive safety and Wi-Fi than the status quo.

The support for moving forward with this proposal is simply overwhelming. It includes a bipartisan juggernaut from Congress, including Senator Ron Johnson, House Energy and Commerce Vice Chair Yvette Clarke, House Energy and Commerce Subcommittee on Communications and Technology Ranking Member Bob Latta, and Representatives Jerry McNerney, Anna Eshoo, G.K. Butterfield, Doris Matsui, Billy Long, Mark Walker, Tom Emmer, Brian Babin, and Andy Biggs. It includes think tanks and consumer groups like ALLvanza, American Commitment, American Conservative Union, American Legislative Exchange Council, American Library Association, Americans for Tax Reform, Center for Individual Freedom, Citizens Against Government Waste, Competitive Enterprise Institute, Consortium for School Networking, Consumer Action for a Strong Economy, Digital Liberty, Discovery Institute, Dynamic Spectrum Alliance, Electronic Frontier Foundation, Engine, Free State Foundation, FreedomWorks, Innovation Defense Foundation, Innovation Economy Institute, Institute for Freedom, Institute for Policy Innovation, Less Government, Lincoln Network, Market Institute, Multicultural Media, Telecom, and Internet Council, National Taxpayers Union, New America's Open Technology Institute, Pelican Center for Technology and Innovation, Public Knowledge, Small Business and Entrepreneurship Council, Taxpayers Protection Alliance, TechFreedom, and WifiForward. It includes industry groups and companies like the 5G Automotive Association, The App Association, Broadcom, Charter, Comcast, Facebook, Ford, Intel, Microsoft, National Puerto Rican Chamber of Commerce, NCTA - The Internet and Television Association, Nokia, Qualcomm, Samsung, Verizon, and the Wireless Internet Service Providers Association.

Thank you to the FCC staff who are working hard to ensure that this spectrum is put to its highest-value use—most notably, my friend and the legendary head of our Office of Engineering and Technology, Julie Knapp. I also would like to thank, from the Office of Engineering and Technology, Reza Biazaran, Rashmi Doshi, David Duarte, Patrick Forster, Howard Griboff, Syed Hasan, Steve Jones Ira Keltz, Paul Murray, Aspa Paroutsas, Jamison Prime, Karen Rackley, Dusmantha Tennakoon, and Ron Williams; from the Wireless Telecommunications Bureau, Tom Derenge, Charles Mathias, Roger Noel, Sean Spivey, and Scot Stone; from the Office of Economics and Analytics, Cate Matraves, Patrick Sun, and Aleks Yankelevich; from the Office of General Counsel, Deborah Broderson, David Horowitz, and Bill Richardson; from the Public Safety and Homeland Security Bureau, David Furth, Renee Roland, Rasoul Safavian, and Michael Wilhelm; from the International Bureau, Jose Albuquerque; from the Enforcement Bureau, Matthew Gibson, David Marks, and Paul Noone; and from the Wireline Competition Bureau, Justin Faulb.

STATEMENT OF
COMMISSIONER MICHAEL O'RIELLY

Re: *Use of the 5.850-5.925 GHz Band*, ET Docket No. 19-308.

There are not enough words to express how pleased I am that we have finally started a proceeding to consider the future of the 5.9 GHz band. After many years of waiting and many twists and turns, this is a great victory for the American people and serves as recognition that sound spectrum policy can triumph over stale rhetoric.

The fact is that two decades have passed since this band was designated for Dedicated Short Range Communications systems, commonly referred to as DSRC, and this spectrum still remains – at least by any rational person's estimation – highly underutilized. For 20 years, the Commission has awaited the great promise of vehicular safety DSRC apps to materialize, but what we have actually received are a few localized systems and limited equipment in a discontinued car line. I think it is safe to conclude that this is not a success story by any measure.

I am in full agreement with the proposal to reallocate 45 megahertz for unlicensed use and 30 megahertz for vehicular safety systems. In fact, the Chairman's proposal is nearly identical to an idea that I discussed publicly and pushed for adoption years ago, as it was consistent with one of the competing industry proposals at the time. It still is the most logical path forward for this band. In particular, it effectively solves the interference issue by splitting the band into two, preserving an exclusive portion dedicated to automobile safety. The lower part of 5.9 GHz is prime spectrum – adjacent to the 5 GHz spectrum that is the Wi-Fi workhorse – and is the obvious and ideal choice, along with 6 GHz, for the much-needed expansion of unlicensed opportunities. And, I won't repeat now the multitude of consumer benefits from bringing forth new unlicensed spectrum, which Commissioner Rosenworcel and I have talked about many times. Suffice it to say, 45 megahertz will be used by the active unlicensed community to bring amazing technological innovations and capabilities forward, far exceeding anything we can imagine today.

I firmly agree that 30 megahertz should provide ample spectrum for vehicular safety applications, be it C-V2X, DSRC, or both, especially if you talk to the engineers and examine the similar efforts occurring internationally. To be clear, I would have preferred a more technology neutral approach over proposing to allocate certain portions of the remaining band for a specific technology, but it will at least work for this stage of the process. Regardless of how these 30 megahertz are, or are not, divvied up between the old DSRC technology and the emerging C-V2X, which appears to have surpassed DSRC in both functionality and popularity, many of the offerings that were originally planned for 5.9 GHz are already being provided using other spectrum bands. Remember that the Commission has supplied the automobile industry with spectrum to support their radar and lidar systems that are used for crash avoidance, and autonomous driving vehicle technologies have been developing using other frequencies. Nonetheless, newer 5.9 GHz systems may be able to address one glaring need: helping to alert drivers and thus prevent accidents when there is no line of sight. For instance, this is critically important when two cars approach an intersection from two different directions and cannot "see" each other because they are blocked by a building. To the extent that these systems can be deployed to save lives, this 30-megahertz of spectrum could be very well-utilized.

I thank my colleagues for agreeing to my edits to propose a clarification that this band be used to provide safety services. Under no circumstances should we provide valuable spectrum resources in this critical location for any offerings that are not safety related, that are commercially available, or that are offered using other spectrum. Given all the safety rhetoric expended on this issue, I dare anyone to claim that this 30-megahertz block should be used for anything other than safety of life.

Further, I appreciate the addition of a question about steps the Commission can take to assure that these safety applications are actually deployed. If these systems are as important as some in the automobile industry assert, and I have seen demonstrations that certainly show C-V2X as promising, they

should be deployed with all due haste. We should not have to wait another 20 years with little progress along the way. And, if these safety applications do not develop, we shouldn't take another 20 years to further reevaluate and reallocate the band either.

Some may try to say that the Commission is taking spectrum away from the automobile industry, which will lead to increased auto fatalities, or that we are putting vehicular safety in jeopardy. Or, that we are doing horrible things just to enable faster Internet connections, sharing Facebook timelines, or posting Instagram pics. That is pure gibberish. Everyone on this dais wants our families, friends, neighbors, and countrymen and women to be safe when traveling in motor vehicles, but DSRC has not come anywhere close to fruition. As this NPRM contemplates, we can simultaneously pursue both auto safety and unlicensed innovation. It's one reason the bulk of automobile manufacturers have come to recognize the wisdom and forward thinking of this item.

Another round of attack will likely come from those who argue that, if a portion of 5.9 spectrum is lost, there will never be any more auto safety spectrum in the future. Again, this is false. To the extent there is a demonstratable spectrum need in the future for auto safety, the Commission likely will give it full consideration. And, we have a track record to prove it: this Commission did exactly that with regards to vehicle radars just a few years ago.

Moreover, even if – and that is an exceptionally big if – it is still a viable technology, DSRC has moved beyond the standard that is codified in our rules, so we must act to complete an update for *any* deployment to occur. Without this proceeding, there is no DSRC, no C-V2X, no unlicensed, and maybe most importantly, no certainty for any investment in this band. Period.

For all these reasons, I thank the Chairman for moving this notice. I look forward to continuing to engage with interested parties on this matter and to going to a final order as soon as possible so that this band can finally be utilized efficiently. We must not wait or be delayed further in getting this done.

I approve.

STATEMENT OF
COMMISSIONER BRENDAN CARR

Re: *Use of the 5.850-5.925 GHz Band*, ET Docket No. 19-308.

The conversation around U.S. leadership in 5G has tended to focus on two topics: infrastructure and spectrum. On infrastructure, we are modernizing our rules so that more Americans can get next-gen services. On spectrum, we are working to clear the wide channels needed to support the new, high-speed services that are increasingly important to our daily lives.

Licensed spectrum, in particular, tends to grab the headlines with 5G. You can understand that given the money involved. This week alone, we commenced an auction that has already raised about $1 billion in bids, and we also approved licenses from two prior auctions that netted around $3 billion.

The high-dollar sums involved with licensed spectrum can obscure the key role that unlicensed spectrum plays in securing U.S. leadership in 5G. You can see the value of Wi-Fi in so many contexts: it powers the primary Internet access point for most Americans (the one in their homes), most wireless traffic is handled on Wi-Fi, and without Wi-Fi offloading, our commercial wireless networks would strain to meet demand. Yet there are even more ways in which unlicensed spectrum will be critical to growing the 5G ecosystem.

Take augmented reality, as an example. AR promises to bring the knowledge and computational power of the Internet into our lives, without the need to stare at a screen and click until we find an answer. AR, when fully implemented, should sense what we are doing and provide aid—directions, recommendations, warnings—without our prompting. Its power is in disintermediating the Internet and life, eliminating the distraction of a device.

To really work, this requires what we've come to describe as 5G performance. AR needs a network that can respond in an instant. AR needs a network that can push data to the user quickly to provide rich graphics and videos. And AR needs a network with the capacity to handle the multitude of devices that Americans will demand.

5G networks using licensed spectrum can provide this performance. But in many cases, unlicensed spectrum will serve as the final link between the cloud and the consumer's device. That's because unlicensed spectrum, at least in the near-term, may be cost-advantaged for delivering massive data streams, may conserve battery life, and may assist in bridging the time for designers and technologists to improve the form factors of 5G devices, especially wearables.

To stimulate the services, devices, and ultimately the networks that make 5G meaningful to everyday Americans, we must have a 5G ecosystem that works everywhere Americans are. 5G services must work at home and in the car, at a coffee shop or in a park. And that means we will need a lot of unlicensed spectrum to help power 5G devices.

The good news is that much of this challenge already has been met. Cable providers have built gigabit speed capabilities to homes and businesses across their footprints. Billions of dollars of investment is made each year in upgrading those wired networks and in researching how to push them to higher gigabit speeds. The bottleneck soon may be not that last mile but those last few feet or inches. As devices demand more data and wired networks deliver more data, a lack of unlicensed spectrum, especially in the home, could leave all of that innovation for not.

I am proud of the Commission for getting ahead of this problem. We now have 580 MHz of unlicensed spectrum in the 5 GHz band. And the Commission actively is looking at 1,200 MHz in the 6 and lower 7 GHz bands as candidates for more unlicensed uses. In between those large swaths of spectrum sits the small but mighty band we consider in this item. The 45 MHz at the bottom of the 5.9 GHz band that we propose to free up for unlicensed use can be combined with the similar spectrum adjacent to it. Together, that would enable the first contiguous 160 MHz channel for unlicensed devices, free of any need to use coordination technologies that slow throughput. This is the type of clear spectrum

channels that Wi-Fi advocates have asked for in 6 GHz, and we have a chance through this item to meet that need starting in 5 GHz.

Growing the 5G ecosystem requires smart spectrum policy. It requires low-, mid-, and high-bands. And it requires both licensed and unlicensed spectrum.

I want to thank the Office of Engineering and Technology for its work on this item. It has my support.

STATEMENT OF
COMMISSIONER JESSICA ROSENWORCEL

Re: *Use of the 5.850-5.925 GHz Band*, ET Docket No. 19-308.

Last year, I traveled to the University of Colorado to kick off a Silicon Flatirons conference. Let me say one thing about the organizers of this event—they really know how to get a party started. They gathered us to discuss what they called the Spectrum Hall of Shame.

I'm still trying to figure out if it was an honor or a slight that I was asked to get that conversation about shame started. But I think we can learn a lot from shame. I think owning up to our mistakes is powerful. It provides us with the opportunity to do better with what lays ahead. In fact, I think there's a deep undercurrent of optimism in studying what went wrong—so in the future we can get it right. This is true of so many things, spectrum policy included.

That brings me to the 5.9 GHz band that is the subject of today's rulemaking.

It is hard to avoid the buzz about driverless cars. You can question if these vehicles are ready for prime time, or quibble with the change they require to our roadways and civic life, but you can't deny that a lot is riding—literally—on the future of how we drive.

But here's the thing—enthusiasm for autonomous vehicles is not new. In fact, if you fall down the internet rabbit hole looking into self-driving cars, eventually you'll land on Francis Houdina and the American Wonder. You see, all the way back in 1925, Francis Houdina founded a radio equipment firm called Houdina Radio Control Company. From the get-go, this company was focused on reinventing transportation. In fact, it built the first radio-operated automobile.

Here's how it happened: Houdina took a 1926 Chandler Sedan and rigged it with an antenna. Then he set it up so that the radio signals it received operated small electric motors that controlled speed and direction. A crew trailing close behind in a second car maneuvered the remote-controlled Chandler. He christened this makeshift effort the American Wonder.

The American Wonder was the first driverless car to roll down the streets of New York City. Of course, Houdina made sure to take all the appropriate precautions. By that I mean he clung to the running board of the car, ready to take the wheel in an emergency.

The demonstration did not end well. As *The New York Times* recounted it, "the radio car careened from left to right, down Broadway, around Columbus Circle, and south on Fifth Avenue, running down two trucks and a milk wagon." At Forty-third Street, after a crash into a fire engine was barely averted, the police put an end to the experiment.

But here's where this failure succeeded—his demonstration captured the public's imagination. We still swoon at the prospect of autonomous driving. We still marvel about what it could mean for driving, for safety—and we still experiment, just not on the streets of New York.

So it was in 1999—two decades ago—when the United States set aside 75 megahertz of spectrum in the 5.9 GHz band for dedicated short range communications, or DSRC. DSRC was designed for cars to talk to each other in real time to help reduce accidents. As the FCC acknowledged, DSRC can improve safety by warning drivers of an impending dangerous condition in time to take corrective action.

But in the twenty years since the FCC allocated this spectrum, that really hasn't happened. Today, autonomous vehicles have moved beyond DSRC to get around and communicate—whether that's with radar, LIDAR, cameras, sensors, on-board mapping tools, or new cellular technologies, like Cellular-Vehicle to Everything, or C-V2X. Today just a few thousand vehicles have DSRC on board out of the more than 260 million cars on the road.

So let's be honest: Our bet on DSRC didn't pan out the way we thought it would. In fact, the National Transportation Safety Board has said it will be up to three decades before the majority of

vehicles on the road have DSRC capability—which is what is needed for this safety technology to be truly effective. Fifty years from spectrum start to finish is a long time. I don't know about you, but I'm hoping we will have flying cars by then.

Let me be clear: we should support automobile safety. However, our spectrum policies supporting safety need to be current. So we should speed the way for our thinking about these technologies to be up to totally up to date. And when we do, let's acknowledge that other countries are doing this using less spectrum than the 75 megahertz that the United States initially set aside and remember that in fact, only a very small portion of those airwaves were set aside by the FCC for basic safety messaging.

So it's time to take a fresh look at this band and see if we can update our commitment to safety and also develop more unlicensed opportunities for Wi-Fi. This is a subject I've worked on with my colleague Commissioner O'Rielly for more than four years. And I want to commend him for his thought leadership on this topic and his perseverance. Turns out persistence pays off. I also want to thank the Chairman for moving forward and kicking off this discussion today.

It's important because Wi-Fi today is congested. Right now, there are over 9 billion Wi-Fi enabled devices. But billions and billions of more devices are coming our way with the internet of things. On top of that, we know that as much as 70 percent of 5G traffic will be offloaded to Wi-Fi. Add this up, and we will need a significant swath of new unlicensed spectrum to keep up with demand.

The 5.9 GHz band is the ideal place to explore Wi-Fi expansion because it's adjacent to an existing unlicensed band. That means we have the opportunity to introduce new wideband channels—channels that will be able to take advantage of new standards and deliver speeds even faster than 1 gigabit per second. In other words, this is where we can start to develop next generation Gigabit Wi-Fi. According to a report issued last year, opening the 5.9 GHz band for Wi-Fi could add between $60 and 105 billion to our gross domestic product.

So I support today's effort. I believe there is no shame in correcting course. And I think it's time to be ambitious and find a way forward that puts the 5.9 GHz band to fuller use.

STATEMENT OF
COMMISSIONER GEOFFREY STARKS

Re: *Use of the 5.850-5.925 GHz Band*, ET Docket No. 19-308.

Congress has tasked the FCC with developing a sustainable communications ecosystem that both meets public safety needs and allows new and innovative technologies to flourish. To do so, we must closely monitor and periodically adjust our spectrum allocations to respond to the needs of today and anticipate the needs of tomorrow. Today we revisit our decision to allocate the 5.9 GHz band to Dedicated Short Range Communications (DSRC) in light of the explosion of innovation in the nearby Wi-Fi bands, the unmet potential of DSRC technology in consumer vehicles, and the promise of new Cellular Vehicle-to-Everything (C-V2X) technology.

Twenty years ago, the FCC saw promise in using wireless communications spectrum to make transportation safer. I believe that conclusion was correct -- Intelligent Transportation System services are critically important and will save lives. Unfortunately, DSRC has fallen short of our expectations. As of today, only one manufacturer has incorporated DSRC technology into its cars in the U.S.—and even then, into only one of its models. Vehicle manufacturers instead use cellular networks and unlicensed spectrum to meet public safety and consumer needs and are turning to 5G networks to implement functionality that was originally intended for DSRC. C-V2X did not exist only a few years ago, and today we are proposing to dedicate up to 30 megahertz for its use. I am pleased that, rather than continuing to be wed to a technology that appears to be stuck in neutral, this agency is showing it can shift into the fast lane of innovation.

Our decision comes at an important time. The problem of Internet Inequality is resulting in significantly different opportunities – in terms of employment, education, civic engagement – for those with high-speed internet service versus those without. The new unlicensed spectrum that we propose to make available today can play a role in connecting people in those unserved communities. In my travels, I've heard repeatedly about how unserved or underserved individuals rely on the Wi-Fi in cities and anchor institutions like schools and libraries. Greater access to faster public Wi-Fi will help disconnected consumers access necessary government services, job opportunities, education and training.

This item also promises to help address another issue that disproportionately affects the most vulnerable. Many of us have paid for fast home broadband service only to experience slow speeds or devices that struggle to connect. The cause, in many cases, is congested Wi-Fi channels in that location. There simply isn't enough Wi-Fi capacity to go around, and the big broadband stream to your home ends up getting reduced to a trickle by the time it gets to your device. This happens regardless of whether you pay for 100 Mbps speeds or a 15 Mbps plan.

Under the proposed approach, however, the 5.9 GHz band can be joined with adjacent unlicensed spectrum to create 160 megahertz of Wi-Fi channels, relieving that congestion and allowing consumers to make the most of their broadband connections, at whatever speed they can afford. This will be particularly helpful for low-income consumers, who are more likely to live in dense urban environments that are subject to the worst Wi-Fi congestion. I look forward to hearing from industry and others about these points.

Finally, I'd like to thank Commissioners O'Rielly and Rosenworcel for their leadership on these issues. I also thank the Office of Engineering and Technology staff for their work on this item.