

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of

Use of the 5.850-5.925 GHz Band

ET Docket No. 19-138

**COMMENTS OF
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I. INTRODUCTION AND SUMMARY

Wi-Fi is now the single most important wireless technology for American households, businesses, and schools. It is the primary onramp to the Internet, connecting laptops, handsets, tablets, game consoles, smart televisions, and IoT devices to wired broadband networks. A majority of all Internet traffic depends on unlicensed bands—more than all other wireless technologies combined.¹ More unlicensed devices are certified at the Federal Communications Commission (Commission or FCC) Lab than any other type of wireless device. And unlicensed bands are critical to the success of 5G, with as much as 70% of 5G traffic expected to be offloaded to unlicensed networks.² Wi-Fi and other unlicensed technologies also produce enormous contributions to the U.S. and world economies.³ The growth of Wi-Fi, and the need for wider channels to power today’s low-latency/high-throughput applications, has created substantial demand for additional unlicensed spectrum resources.

The 5.9 GHz band will play an important role in meeting this demand. But achieving the 5.9 GHz band’s full potential depends on robust indoor and outdoor deployments. It is also important that the Commission’s rules governing outdoor operations protect Department of Defense (DOD) systems. NCTA has long advocated that the Commission should adopt rules

¹ Comments of NCTA – The Internet & Television Association at 4, ET Docket No. 19-138 (filed Mar. 9, 2020) (NCTA Comments).

² See, e.g., Cisco Systems Inc., Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update (2017-2022), at 17, available at <https://s3.amazonaws.com/media.mediapost.com/uploads/CiscoForecast.pdf> (last visited June 1, 2021).

³ See, e.g., Raul Katz et al., Telecom Advisory Services, LLC, The Economic Value of Wi-Fi: A Global View (2021 - 2025) at 7-8 (Feb. 2021), https://www.wi-fi.org/download.php?file=/sites/default/files/private/The_Economic_Value_of_Wi-Fi-A_Global_View_2021-2025.pdf (using a conservative baseline scenario, “Wi-Fi’s total global economic value” as of 2021 is approximately \$3.3 trillion, projected to reach \$4.35 trillion in 2025, and value of Wi-Fi in the United States is \$995 billion in 2021, and nearly \$1.6 trillion by 2025).

that permit both indoor and outdoor operations at standard power without exclusion zones. But in light of the October 2020 technical analysis submitted by the National Telecommunications and Information Administration (NTIA), NCTA now recommends that, in addition to the indoor operations permitted by the *First Report and Order*, FCC rules:

- (1) Permit outdoor unlicensed operations at 36 dBm standard power outside of NTIA's proposed exclusion zones for government radars (but not inside such exclusion zones); and
- (2) Permit a low-power 23 dBm equivalent isotropically radiated power (EIRP) class of unlicensed devices to operate anywhere, inside or outside the exclusion zones.

In addition, the Commission should adopt reasonable power spectral density (PSD) limits and out-of-band-emission (OOBE) limits consistent with the *FNPRM* proposals to make U-NII-4 operations flexible and cost-effective for consumers. It should also permit client-to-client communications. Finally, the Commission should ensure that its rules for the transition from Dedicated Short Range Communications (DSRC) to Cellular Vehicle-to-Everything (C-V2X) and the new operational rules for that technology do not undermine the important progress the Commission made in the *First Report and Order*.

II. THE COMMISSION CORRECTLY DETERMINED THAT OPENING THE 5.9 GHz BAND TO UNLICENSED TECHNOLOGIES WILL IMPROVE CONSUMER BROADBAND.

A. The *First Report and Order* Found that 5.9 GHz Unlicensed Spectrum Will Facilitate Access to a 160-Megahertz Channel for Next-Generation Wi-Fi, Including Through Upgrades to Existing Equipment.

In the *First Report and Order*, the Commission explained that the rules it adopted “will, in combination with those rules governing the adjacent U-NII-3 band, enable the first contiguous 160-megahertz channel for U-NII devices below 6 GHz that will not require use of [Dynamic

Frequency Selection (DFS)] interference mitigation technologies.”⁴ Because “many existing 5 GHz-capable devices can take advantage of 5.9 GHz spectrum with software or firmware changes,”⁵ and because the Commission’s rules do not require complex technologies like DFS, consumers will realize the benefits of the Commission’s important decision in the near future. Similarly, the “equipment approval process” for new indoor devices using U-NII-4 spectrum “will be straightforward and not entail additional complex tests.”⁶

That “readily available 160-megahertz channel will enable new applications that will help maintain the United States’ role as an innovator and global spectrum policy leader.”⁷ Under the Wi-Fi 6 standard, 160-megahertz channels offer new opportunities for efficiently sharing spectrum, delivering multi-gigabit speeds, and unleashing capacity for high-bandwidth, low-latency applications like high-definition streaming, real-time two-way AR/VR, backhaul for Wi-Fi extenders, real-time remote monitoring that relies on multiple cameras, remote robotics involving non-repetitive functions, and more. The larger channel size will also support the boom of telemedicine and remote health services triggered by the global pandemic, which rely on applications that require real-time sharing and high data volume.

Although the Commission’s decision to enable indoor access to the band is important to build momentum toward these developments, as discussed in more detail below, outdoor use of the band is critical to enabling a robust ecosystem of 5.9 GHz equipment. Fulfilling the promise

⁴ *Use of the 5.850-5.925 GHz Band*, First Report and Order, Further Notice of Proposed Rulemaking, and Order of Proposed Modification, 35 FCC Rcd. 13,440, ¶ 23 (2020) (*First Report and Order* or *FNPRM*).

⁵ *Id.* ¶ 22.

⁶ *Id.* ¶ 23.

⁷ *Id.* ¶ 23.

of 5.9 GHz for the applications described above depends upon the Commission’s rapid establishment of technical rules for outdoor operations.

B. Consumer Demand for Additional Wi-Fi Spectrum Continues to Grow as the Nation Responds to the Public Health Crisis.

The Commission also correctly concluded in the *First Report and Order* that making U-NII-4 spectrum available for Wi-Fi and other unlicensed technologies will help ease congestion.⁸ “The availability of spectrum for unlicensed use is more critical than ever before.”⁹ As the Commission noted, increasing pressure on Wi-Fi spectrum is a long-term issue, given projections that demand for unlicensed spectrum will continue to increase significantly in the coming years.¹⁰ But demands on Wi-Fi have also increased in the past year during the COVID-19 pandemic, as “more households are turning to distance learning, teleworking, and social networking.”¹¹ For example, the *First Report and Order* cites statistics from spring 2020 showing large increases in Wi-Fi calling and Wi-Fi offloading from mobile devices.¹² Those jumps in demand have continued through 2020 and into 2021.

The Commission’s actions in the *First Report and Order* will help address this growing demand. Service providers that deploy Wi-Fi routers are already actively working with vendors to upgrade existing indoor equipment. The newly available spectrum will improve the Wi-Fi experience not only of consumers whose devices are upgraded, but also of consumers with

⁸ *Id.* ¶¶ 21-22.

⁹ *Id.* ¶ 16.

¹⁰ *See id.* ¶ 15.

¹¹ *Id.* ¶ 16.

¹² *Id.*

equipment that only uses other unlicensed spectrum, as the availability of U-NII-4 can carry some of the demand for other bands.

III. THE COMMISSION SHOULD ADOPT RULES THAT PERMIT ROBUST OUTDOOR INVESTMENT AND DEPLOYMENT.

While the *First Report and Order* represents a substantial improvement in unlicensed spectrum availability, the Commission should permit outdoor and portable Wi-Fi devices to realize the full value of the band. Existing rules restrict to indoor operations any device in U-NII-4, or in the U-NII-3 band when using channels (like the new 160-megahertz channel) that span both U-NII-3 and U-NII-4. As consumers depend on mobility and the ability to operate both indoors and outdoors for a wide variety of applications, this current restriction significantly limits the overall utility of the band. It also may deter some Wi-Fi manufacturers from upgrading consumer devices to support 5.9 GHz, limiting the ecosystem and potentially delaying providers' abilities to deliver benefits to consumers.

The Commission's actions early in the COVID-19 pandemic demonstrate the importance of outdoor U-NII-4 operations. The Commission granted wireless internet service providers (WISPs) special temporary authority to use the lower 45 megahertz of the 5.9 GHz band outdoors. Those providers were able to help "address the increased demand for broadband associated with the COVID-19 pandemic."¹³ The *First Report and Order* reflects the success of that effort by providing a platform for further short-term relief, determining that the Commission "will consider requests for full power outdoor operations through our existing regulatory process for individualized and temporary access to spectrum (e.g., STA and/or waiver), which will be coordinated with NTIA to ensure that federal incumbents are protected from harmful

¹³ *Id.* ¶ 24 n.61.

interference.”¹⁴ But this short-term relief through STAs is not appropriate as a permanent solution, and carries with it substantial uncertainty that will erect barriers to manufacturer investments and upgrades needed to bring the band into full use.

The *FNPRM* recognizes this need and presents the Commission the opportunity to adopt long-term rules for outdoor and portable operations. Outdoor access to the 160-megahertz U-NII-3/4 Wi-Fi channel will bring consumers better broadband at stadiums, outdoor retail venues, and public parks, and allow Wi-Fi networks to carry additional traffic, deliver higher speeds, and result in the lower latency necessary for remote learning on school grounds and university campuses, streaming high-resolution video, and other modern and next-generation educational applications. It also will spur the development and production of more 5.9 GHz-capable devices, broadening the consumer benefits of this valuable spectrum band. WISPs will be able to increase capacity and speeds for their customers, many of whom are in areas where mobile cellular coverage is not widely available. And direct communications between portable devices will drive the development of applications and hardware to allow consumers to access immersive applications like augmented reality and virtual reality.

This success depends on the Commission adopting technical rules that permit widespread and diverse deployments using U-NII-4 spectrum. Specifically, NCTA recommends that the Commission: (1) permit fixed standard-power 36 dBm EIRP unlicensed operations outdoors except in exclusion zones necessary to protect incumbent federal systems; (2) permit 23 dBm EIRP fixed or portable operations (a reduction in power of nearly 95% compared to standard-power unlicensed, and the same power level that the Commission proposed for outdoor C-V2X

¹⁴ *Id.* ¶ 13; *see also id.* ¶ 59 (“We . . . will allow some outdoor operations in certain specified locations in the band through the STA process (i.e., on a non-interference basis), where such operations would not cause harmful interference to any incumbent operations.”).

On-Board Units (OBUs)) both indoors and outdoors in any location; (3) maintain the existing U-NII-3 OOBE limit of -5 dBm/MHz at 5895 MHz and -27 dBm/MHz at 5925 MHz; and (4) permit a PSD of 23 dBm/MHz for standard-power operations and at least 10 dBm/MHz for 23 dBm EIRP operations. This set of technical rules will protect incumbent operations while promoting the investment and deployment necessary to bring the U-NII-4 band into use for unlicensed devices.

A. The Commission Should Adopt NTIA’s Proposed Exclusion Zones for 36 dBm EIRP Outdoor Unlicensed Operations.

The Commission asks whether “exclusion zones would be the best method for ensuring” that outdoor U-NII-4 operations “do not cause harmful interference to federal radiolocation systems.”¹⁵ Exclusion zones should generally be a last resort for protecting one class of operations from another because they typically do not offer sufficient flexibility for deployment and undermine the efficiency of shared-spectrum approaches. Where truly necessary, exclusion zones should be as narrowly tailored as possible. NCTA has previously recommended that the Commission permit standard-power 36 dBm EIRP unlicensed operations outdoors without exclusion zones, based on its analysis that such operations would not cause harmful interference to incumbent operations.¹⁶ In light of the position expressed by NTIA in its October 2020 analysis,¹⁷ however, we now recommend that the Commission adopt the exclusion zones

¹⁵ *FNPRM* ¶ 172.

¹⁶ See Letter from Danielle J. Piñeres, NCTA, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-138, at 2-3 (filed Oct. 9, 2020) (NCTA Oct. 9, 2020 Ex Parte); Letter from Paul Margie, Counsel to NCTA, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-138, at 2-3 (filed Nov. 9, 2020) (NCTA Nov. 9, 2020 Ex Parte) (encouraging the Commission to seek comment on the NTIA technical report, released only days before the Draft Order was posted).

¹⁷ Edward Drocella, Yang Weng, et al., NTIA Technical Report 21-551, *Compatibility of Federal Systems Operating in the 5850-5925 MHz Band with Intelligent Transportation*

referenced in NTIA's study for standard-power Wi-Fi. NCTA does not agree with all aspects of the study, and we urge the Commission to recognize that important assumptions about Wi-Fi characteristics are not accurate, including duty cycle assumptions.¹⁸ But, in the interest of making this valuable spectrum available to consumers as soon as possible, and in recognition of the importance of the government radar operations in this band, we modify our previous recommendation for standard-power Wi-Fi to accommodate NTIA's position and agree that the Commission can adopt exclusion zones for standard-power Wi-Fi operations. While we believe the exclusion zones are larger than necessary to prevent harmful interference to federal radiolocation systems from 36 dBm unlicensed operations, we appreciate NTIA and DOD's efforts to reduce the size of these zones compared to previous zones. NCTA recommends that the Commission adopt these smaller zones and continue to collaborate with engineers at NTIA and DOD to reduce the size of those zones in the future.

The Commission should therefore adopt rules that prohibit standard-power Wi-Fi access points from operating in designated exclusion zones. These rules should require parties planning to install outdoor, standard-power fixed access points using U-NII-4 spectrum to inform the Commission of their plans and to explicitly agree not to operate those outdoor access points within the exclusion zones. The Commission has utilized effectively the same process for

Systems and Unlicensed National Information Infrastructure Devices (Oct. 2020) (NTIA Technical Report), as attached to Letter from Kathy Smith, Chief Counsel, NTIA, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-138 (filed Oct. 22, 2020).

¹⁸ For example, the study overstates the Wi-Fi activity factor and does not appear to consider variations in access-point placement and orientation that may reduce antenna gain toward a radar. Further, the study relies on propagation modeling choices that may understate loss, such as using the point-to-area mode of the ITM model for some cases and not using building height databases that could show additional propagation obstructions. Other assumptions are simply not clear, such as radar receive antenna gains, noise figures, and availability criteria. This, in turn, makes it difficult to evaluate some parameters that were provided.

WISPs operating in 5850-5895 MHz (*i.e.*, what is now U-NII-4) since the beginning of the COVID-19 pandemic. Interested parties have filed Form 601 to seek a Special Temporary Authorization (STA) on a county-by-county basis and agreed to, among other things, “protect federal radiolocation services operating in the 5.8 GHz band and, to afford such protection,” to avoid operation within 75 kilometers of locations specified by the FCC.¹⁹ The WISP STAs have proven enormously successful in allowing WISPs to serve their communities while committing not to operate within the exclusion zones.

The Commission can achieve the same protection for federal systems by adopting appropriate technical rules and requiring a similar notification and agreement from parties interested in full-power outdoor U-NII-4 operations.²⁰ The Commission should require only providers seeking to deploy a large number of access points (for example, 1,000, as in U-NII-1) to make such a filing. Following the general process of the Commission’s STA approach, parties required to file would (1) certify that they will not operate in the specified exclusion zones and (2) list the counties in which they intend to deploy outdoor full-power access points.

¹⁹ Letter from Keith Harper, FCC, to Steve Coran, Counsel for Joint Wireless Internet Service Providers, at 2 (Mar. 27, 2020), <https://docs.fcc.gov/public/attachments/DOC-363358A2.pdf>. WISPs seeking STAs also agree to obey certain other conditions, such as coordinating as needed with incumbent ITS licensees, complying with height limitations, and attenuating emissions at 5895 MHz to a particular power level. *See id.* In adopting rules for outdoor unlicensed operations in U-NII-4, the Commission will eliminate the need for parties to agree to such conditions.

²⁰ 47 C.F.R. § 15.407(j) similarly requires parties deploying “an aggregate total of more than one thousand outdoor access points within the 5.15-5.25 GHz band” to “submit a letter to the Commission acknowledging that, should harmful interference to licensed services in this band occur, they will be required to take corrective action.”

B. The Commission Should Permit 23 dBm EIRP Indoor and Outdoor Unlicensed Operations Without Exclusion Zones.

The NTIA Technical Report found that the operation of mobile 23 dBm C-V2X transmitters within exclusion zones would not cause interference with federal systems.²¹ In fact, the NTIA Technical Report found not only that the Commission could allow such operations within exclusion zones, but also that “coordination of these devices would not be necessary to protect federal operations.”²² Notably, unlike Roadside Units (RSUs), these 23 dBm OBUs are not individually licensed, instead operating on a licensed-by-rule basis that permits the operation of millions of units, with no rules that the units contain geolocation capability for interference tracking or otherwise be remotely controlled by a licensee.²³ Intelligent Transportation Systems (ITS) advocates assert that they will permeate U.S. roadways throughout urban, suburban, and rural areas, travelling and transmitting anywhere an OBU-equipped vehicle can go.²⁴

NTIA’s finding that 23 dBm EIRP OBUs can operate in exclusion zones, without coordination, supports a Commission decision to also permit unlicensed devices to use U-NII-4 spectrum at 23 dBm EIRP, indoors or outdoors, with no exclusion zones. We believe that higher-power unlicensed devices also could operate without causing harmful interference to DOD operations. But this dramatically reduced power level—1/20th the strength of standard-

²¹ NTIA Technical Report at 12, 36.

²² *Id.* at 40.

²³ See 47 C.F.R. § 95.305; *FNPRM* ¶ 150 & n.406.

²⁴ See, e.g., Reply Comments of the 5G Automotive Association at 26, ET Docket No. 19-138 (filed Apr. 27, 2020) (asserting that the “ultimate goal of this proceeding” is “accelerating the widespread deployment of ITS *in consumer vehicles*”); Richard Engelman, *Spectrum Requirements for Intelligent Transportation Systems* 3 (Oct. 5, 2020), *as attached to* Letter from Paul G. Schomburg, Panasonic, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-138 (filed Oct. 6, 2020) (core vehicle-to-vehicle applications utilize “continual repetitive messages” transmitted “repeatedly by every active C-V2X-equipped vehicle”).

power Wi-Fi—clearly addresses NTIA’s concerns regarding potential harmful interference to federal radiolocation systems. At the same time, it is sufficient to make possible an important sub-class of unlicensed devices: battery-powered, lower-power devices that would support a wide variety of portable use cases and promote investment in and development of the 5.9 GHz consumer device ecosystem.²⁵

Broadcom and Facebook explained earlier in this proceeding how “for the 5.9 GHz band to reach its full potential and enable new cutting-edge use cases with a robust ecosystem of devices, the rules should allow for outdoor, and especially portable use.”²⁶ Standard-power operations installed outside exclusion zones will support a wider variety of use cases, but given the very large size of the DOD exclusion zones, it is important that portable devices like smartphones, wearables, and other products be able to function using U-NII-4 spectrum wherever consumers are located (whether or not that is in an exclusion zone). A lower-power device class unconstrained by rigid exclusion zones will give manufacturers the ability to design targeted products at lower cost for consumers and allow for broader consumer use of the band.

This lower-power device class can operate within exclusion zones without causing harmful interference to federal systems in the band. The *NPRM* proposed that C-V2X OBUs be permitted to transmit at 23 dBm EIRP.²⁷ And “based upon the Commission’s proposed rules for

²⁵ See *FNPRM* ¶¶ 172, 175, 176-79 (seeking comment on, *inter alia*, whether alternatives to exclusion zones would be “feasible methods of protecting federal operations in certain areas,” “other alternatives that achieve the same goal; that is, methods that achieve the required protection and are easy and cost effective to implement and maximize utility of the U-NII-4 band,” and on appropriate power levels for U-NII-4 devices).

²⁶ Letter from Alan Norman, Facebook, Inc., and Christopher Szymanski, Broadcom Inc., to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-138, at 2 (filed Sept. 25, 2020) (Broadcom/Facebook Sept. 25, 2020 Letter).

²⁷ *Use of the 5.850-5.925 GHz Band*, Notice of Proposed Rulemaking, 34 FCC Rcd. 12,603, ¶¶ 38-39 (2019) (*NPRM*).

C-V2X OBUs,” NTIA’s analysis “indicate[d] that coordination of th[o]se devices would not be necessary to protect federal operations”²⁸—*i.e.*, the OBUs could operate inside and outside the zones NTIA identified without the coordination required for RSU deployment or any other restrictions. 23 dBm EIRP Wi-Fi devices would present an even lower risk of harmful interference than OBUs. The NTIA Technical Report assumed a “50% duty cycle” for OBU operations,²⁹ which is vastly higher than the “average weighted activity factor [of] 0.4%” for Wi-Fi that was drawn from real-world Wi-Fi measurements and that the Commission relied on in its 6 GHz rulemaking proceeding.³⁰ Use of U-NII-4 devices authorized to operate up to the same 23 dBm EIRP level will thus present substantially less risk of harmful interference to federal systems and should likewise be permitted inside and outside any exclusion zones. It would be arbitrary to treat one technology differently than the other in this case.

The simplest way to enable these lower-power operations is for the Commission to create a 23 dBm EIRP category of U-NII-4 device, separate from both (1) the existing classifications of indoor access points, subordinate devices, and associated clients and (2) the anticipated classifications of outdoor full-power access points and associated client devices. For this 23 dBm-maximum device class, there would be no need to distinguish between access points and client devices, as the devices would be free to operate indoors or outdoors, inside or outside

²⁸ NTIA Technical Report at 40; *see also id.* at 12.

²⁹ *Id.* at 13 (footnote omitted).

³⁰ *Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Red. 3852, ¶ 131 (2020) (*6 GHz Order*). NTIA also used a “50 percent duty cycle” for unlicensed operations in its study, NTIA Technical Report at 17, which is incorrect and inconsistent with CableLabs data the Commission credited in the *6 GHz Order*. *6 GHz Order* ¶ 141.

exclusion zones, at a maximum radiated power of 23 dBm EIRP, and subject to the same OOB limit as full-power outdoor U-NII-4 devices.

The *FNPRM* discusses how the Commission believes that limiting the EIRP of C-V2X OBUs “to no more than 23 dBm . . . continue[s] to be appropriate for C-V2X vehicular and portable devices and propose[s] those levels here.”³¹ But the Commission notes that 5GAA has “recently requested that the Commission eliminate the output power requirement and increase the OBU EIRP limit to 33 dBm” and asks what “effect . . . such an increase [would] have on the ability of C-V2X roadside units to co-exist with and protect federal radiolocation stations.”³² Appendix B to the *FNPRM* lists 33 dBm EIRP as the transmit power limit for C-V2X OBUs.³³

If the Commission and federal stakeholders determine that C-V2X OBUs can safely co-exist with federal radiolocation operations using a 33 dBm EIRP limit, the Commission should also permit U-NII-4 devices to operate *at least* at the same EIRP limit without exclusion zones. In fact, correcting for NTIA’s extremely high duty-cycle assumption for U-NII-4 devices likely would show that under NTIA’s analysis, no exclusion zones should be needed even for standard-power unlicensed operations. Consequently, if the Commission determines these power levels are reasonable for C-V2X OBU operations, they would be even more protective for Wi-Fi operations, and it would be arbitrary to allow a higher power level for C-V2X OBUs than Wi-Fi. In this case, there would be no need for a 23 dBm EIRP device class.

³¹ *FNPRM* ¶ 161.

³² *Id.*

³³ *Id.*, App’x B, § 95.3167(a).

C. The Commission’s Other Rules for Outdoor Operations Should Enable Innovation and Avoid Unnecessary Technical Mandates.

1. In-Band Power Levels Should Be 36 dBm EIRP and 23 dBm/MHz for Standard-Power Outdoor Access Points, Indoor Access Points, and Subordinate Devices.

NCTA strongly supports the Commission’s proposal to authorize U-NII-4 in-band radiated power of “23 dBm/MHz or 36 dBm radiated power for all bandwidths” for outdoor unlicensed operations³⁴ and to increase the in-band power limits for indoor unlicensed operations to those same levels³⁵ once the sparse existing ITS operations have moved to the top 30 megahertz of the 5.9 GHz band. The Commission correctly notes that “permitting U-NII-4 devices to operate at the same power levels as U-NII-3 devices is essential to achieving the full benefits of the U-NII-4 band and maximizing the utility of both bands.”³⁶

The 23 dBm/MHz or 36 dBm EIRP limit protects federal radiolocation operations from harmful interference. Assuming the Commission adopts NTIA’s proposed exclusion zones, full-power outdoor access points and associated clients will operate far from federal radars. And with respect to “indoor U-NII-4 devices,” the Commission rightly notes that “these proposed limits are consistent with NTIA’s radiolocation protection analysis.”³⁷ Increasing this limit will not cause harmful interference to ITS operations, either. After “ITS operations move out of the U-NII-4 band,” there is no need to limit in-band radiated power indoors or outdoors to protect those former incumbents.³⁸ The decision in the *First Report and Order* to limit indoor radiated

³⁴ *Id.* ¶ 179.

³⁵ *Id.* ¶ 186. NCTA does not object to the Commission’s proposed rule that client devices under the control of indoor access points or full-power outdoor access points be 6 dB lower, with a limit of 30 dBm EIRP and 17 dBm/MHz PSD.

³⁶ *Id.* ¶ 179.

³⁷ *Id.* ¶ 186.

³⁸ *Id.* ¶ 179.

power for access points and subordinate devices to 20 dBm/MHz was a conservative, temporary measure to “protect co-channel ITS incumbent operations” while they still operate in 5850-5895 MHz.³⁹ But once those operations are successfully transitioned, the need for that limit disappears.

2. In-Band Power Levels Should Be 23 dBm EIRP and No Less than 10 dBm/MHz for Lower-Power Outdoor Devices.

For the separate 23 dBm EIRP device class described above, the Commission can adopt a lower PSD limit, no less than 10 dBm/MHz. This lower PSD limit will offer even greater protection for co-channel federal radars than the 23 dBm/MHz limit discussed above, whether these lower-power devices operate inside or outside any exclusion zones that would apply for higher-EIRP operations. This lower PSD limit would still, however, allow 23 dBm EIRP devices to operate at their full permitted power using a variety of channel sizes.

3. The Commission Should Adopt an OOB Limit for Outdoor Unlicensed Operations No More Restrictive than the *FNPRM* Proposal.

NCTA also supports the Commission’s efforts to adopt an OOB limit for outdoor U-NII-4 operations that “will protect adjacent-band ITS operations from harmful interference” and “provide flexibility for devices to operate across the U-NII-3 and U-NII-4 bands using the widest channel bandwidths permitted under the IEEE 802.11 standard.”⁴⁰ The Commission’s proposal in the *FNPRM*, -5 dBm/MHz at 5.895 GHz, decreasing linearly to -27 dBm/MHz at 5.925 GHz, measured using an RMS measurement, achieves both those objectives.⁴¹

³⁹ *Id.* ¶ 186.

⁴⁰ *Id.* ¶ 183.

⁴¹ *Id.*

While the Commission’s proposed limits are more conservative than necessary to protect ITS operations from harmful interference, NCTA believes they will still enable widespread and beneficial use of the U-NII-4 band by consumers.⁴² As for protection of ITS operation in the top 30 megahertz of the band, the Commission “previously affirmed” even before the *First Report and Order* that those same limits in the U-NII-3 band “protect DSRC operations” and “have already proven to be effective in protecting ITS operations from harmful interference.”⁴³ And the Commission relied on those limits in setting the OOB limits for indoor U-NII-4 operations in the *First Report and Order*, while “tak[ing] advantage of building attenuation, as well as other factors.”⁴⁴ The Commission can thus adopt the U-NII-3 OOB limit for outdoor operations as well, based on the same reasoning.

4. The Commission Should Not Impose an Unnecessary 21 dBm Power Limit Above 30-Degree Elevation for Outdoor Access Points.

The Commission should not require “outdoor access points to limit the maximum EIRP above a 30 degree elevation angle to 21 dBm.”⁴⁵ The Commission acknowledges that this is a “precautionary measure to further protect FSS operations from harmful interference,”⁴⁶ but that

⁴² NCTA and other proponents of unlicensed operations in U-NII-4 have, of course, advocated for less restrictive OOB limits and presented technical analysis demonstrating that the Commission could adopt those limits for indoor and outdoor unlicensed operations without a significant risk of harmful interference. We continue to believe that the Commission’s approach is more conservative than necessary, but we support the compromise nonetheless.

⁴³ *FNPRM* ¶ 183; see also *First Report and Order* ¶ 83 (same); *First Report and Order* ¶ 80 & n.211 (noting that the U-NII-3 OOB specifications predating this proceeding “result in OOB limits of -5 dBm/MHz at 5.895 GHz, decreasing linearly to -27 dBm/MHz at 5.925 GHz”); *First Report and Order* ¶ 83 n.223 (citing previous Commission decisions regarding U-NII-3 OOB limits).

⁴⁴ *First Report and Order* ¶ 83.

⁴⁵ *FNPRM* ¶ 184.

⁴⁶ *Id.*

precaution is unnecessary and would unduly limit flexibility and increase costs for Wi-Fi deployments.

In the *First Report and Order*, the Commission rejected requests from Intelsat and SES to impose a restrictive aggregate interference limit monitored and controlled by a database. It explained that Intelsat and SES “do not include any specific technical analysis or maximum aggregate power level for their particular position,” and concluded that “[c]onsidering that the FSS satellites receiving in the 5.850-5.925 GHz band are limited to geostationary orbits, approximately 35,800 kilometers above the equator, . . . it is unlikely that relatively low-power unlicensed devices would cause harmful interference to the space station receivers, especially since such devices are not expected to radiate significant power skyward.”⁴⁷

The Commission was right to reject those requests, and its reasoning also explains why the proposed 30-degree elevation “precautionary measure” is unnecessary. Indeed, NCTA previously explained that this enormous distance for FSS satellites operating in the 5.9 GHz band (more than 35,000 kilometers) was far greater than the height of mobile satellites in U-NII-1 (1,400 kilometers at their closest orbital point), where the Commission has previously adopted this 21 dBm limit above 30-degree elevation.⁴⁸ And while the Commission adopted this limit in U-NII-5 and U-NII-7 (also expressly as a “precautionary measure”),⁴⁹ those bands fall within the conventional C-band, in which FSS operations are far more common than the extended C-band

⁴⁷ *First Report and Order* ¶¶ 89, 91.

⁴⁸ Reply Comments of NCTA – The Internet & Television Association at 46, ET Docket No. 19-138 (filed Apr. 27, 2020).

⁴⁹ *6 GHz Order* ¶ 92.

into which U-NII-4 falls.⁵⁰ Even if the precautionary measure is warranted in U-NII-5 and U-NII-7, SES and Intelsat have not justified the need for it here.

That is particularly important given the significant cost of these unnecessary precautions in U-NII-4. The Commission speculates that the requirement will not “impose a burden on or affect the utility of outdoor access point users” because “we do not expect outdoor access points to radiate significant power skyward.”⁵¹ While 21 dBm or greater radiation above 30-degree elevation may not be expected in most situations, a requirement not ever to exceed that threshold imposes costs that will ultimately make devices more expensive for consumers. It also constrains the flexibility of otherwise permissible deployments. And those effects are doubly significant, as the limitation will apply not only to channels entirely within U-NII-4, but also presumably to channels spanning U-NII-3 and U-NII-4, even though U-NII-3 currently has no such restriction. Existing U-NII-3 equipment deployed outdoors likely would not be capable of upgrades given this requirement, and new equipment intended to use U-NII-3 and U-NII-4 together will be less flexible and unnecessarily complex.

IV. THE COMMISSION SHOULD ADOPT CLIENT-TO-CLIENT RULES THAT SUPPORT REASONABLE CONSUMER USE OF THE BAND.

The Commission also should remove the current client-to-client communications prohibition as proposed in the *FNPRM*.⁵² Client-to-client operations are important to consumer use and manufacturer development of the band. The Commission rightly notes that they could

⁵⁰ See *id.* ¶ 9 (“FSS operations are heaviest in the U-NII-5 band”); see *NPRM* ¶ 49 (describing extended C-band operations “limited to international inter-continental systems and subject to case-by-case electromagnetic compatibility analysis”).

⁵¹ *FNPRM* ¶ 184.

⁵² See *id.* ¶ 187.

enable “innovative new virtual reality or augmented reality applications.”⁵³ Broadcom and Facebook have explained that the “next iteration of Wi-Fi,” using wider channels like the 160-megahertz channel the Commission enabled in the *First Report and Order*, can allow for “gigabit connectivity with lower latency, improved coverage, and power efficiency.”⁵⁴ And in particular, these advances “will allow for the introduction of immersive, real-time applications” using “portable, wearable devices” that “will significantly aid innovation in cloud computing and healthcare.”⁵⁵

For portable devices to deliver those applications, however, they must be able to communicate directly with one another, without routing all traffic through one or more access points. And the ability to do so is very important for the development of a robust device ecosystem using U-NII-4. Device manufacturers will invest more heavily in mobile and portable client devices if they are permitted to operate flexibly both indoors and outdoors. Indeed, Broadcom and Facebook have warned that without the ability to operate in peer-to-peer mode outdoors, “device manufacturers will have little incentive to build 5.9 GHz capability into devices, which will impact the overall utility of the band, even for indoor use.”⁵⁶

Fortunately, the Commission can adopt sensible rules that make indoor and outdoor client-to-client communications possible while still protecting against harmful interference either to co-channel federal operations or to adjacent-channel ITS operations. As discussed above in Section III.B, NTIA’s technical analysis demonstrates that even under its very conservative approach, C-V2X OBU operations at 23 dBm do not create a substantial risk of harmful

⁵³ *Id.*

⁵⁴ Broadcom/Facebook Sept. 25, 2020 Letter at 2.

⁵⁵ *Id.*

⁵⁶ *Id.*

interference to federal systems.⁵⁷ Accordingly, devices in the 23 dBm-maximum unlicensed device class (for which there is no need to distinguish between access points and clients) should be permitted to communicate with any other device using U-NII-4 spectrum at that same power level. Moreover, devices that are clients of indoor access points or full-power outdoor access points in U-NII-4 should likewise be permitted to communicate with other client devices, at a maximum power level of at least 23 dBm EIRP. There is no need for exclusion zones at that power level to protect federal operations from harmful interference. And the Commission's OOBE limits discussed in Section III.C.3 herein will protect adjacent ITS operations from harmful interference, particularly at this 23 dBm EIRP maximum in-band power level.

V. THE DSRC TRANSITION AND C-V2X OPERATIONAL RULES SHOULD NOT UNDERMINE THE *FIRST REPORT AND ORDER*.

The Commission also asks questions regarding the “transition of ITS in the upper 30 megahertz” of the 5.9 GHz band “from DSRC to C-V2X operations, including the timing and procedures needed to ensure a smooth transition.”⁵⁸ In the past, NCTA has supported the reallocation of the full band for unlicensed operations, as the Commission's experiment decades ago with granting DSRC exclusive, auction-free use of the band was unsuccessful. In furtherance of the Commission's pragmatic band-segmentation compromise, however, we now support the successful transition of incumbent licensees to C-V2X operations in the top 30 megahertz of the band consistent with the *First Report and Order*. We focus here on several aspects of the transition and the new C-V2X rules to ensure the Commission's next order following the *FNPRM* does not undermine the important progress it made in the *First Report and Order*.

⁵⁷ See *FNPRM* ¶ 187 (discussing this aspect of NTIA's report).

⁵⁸ *Id.* ¶ 146.

A. In Managing the DSRC-to-C-V2X Transition, the Commission Should Not Require or Provide Compensation to DSRC Licensees to Re-Tune Equipment or Transition to C-V2X.

The *FNPRM* seeks comment on several important issues relating to the transition from DSRC operations permitted throughout the 5.9 GHz band to C-V2X operations in the top 30 megahertz of the band. For example, the Commission seeks to “update the record” on “transition cost considerations in light of the 5.9 GHz band plan that we have adopted,” including “any funding grants that have been provided or are anticipated” that can “readily be used with regard to the necessary transition costs, including the use of C-V2X-based technology.”⁵⁹

The deployment of C-V2X at the scale needed for it to deliver the benefits promised by its proponents, meaning an enormous expansion over today’s pilot projects, will very likely require significant taxpayer funding, just as was the case for DSRC. NCTA does not have a position on such a program. But the government should approach funding the transition of sparse existing DSRC operations to C-V2X as one part of that much larger policy issue, rather than expecting the Commission to provide transition funding. If the advancement of the new C-V2X technology is federal transportation policy, the Department of Transportation and other transportation policymakers are best positioned to direct some portion of the several billions of dollars in federal, state, and local funds that have gone to “research and deployment investments across the Nation”⁶⁰ to funding the transition from DSRC to C-V2X. Indeed, millions of dollars

⁵⁹ *Id.* ¶ 166.

⁶⁰ Comments of the U.S. Department of Transportation at 36, ET Docket No. 19-138 (Mar. 9, 2020), *as attached to* Letter from Charles Cooper, Associate Administrator for Spectrum Management, NTIA, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-138 (filed Mar. 13, 2020).

in grant funds already have gone to state departments of transportation for implementing C-V2X.⁶¹

The Commission should not, however, accept the suggestion by some parties that it provide compensation for DSRC interests to buy new C-V2X equipment, or to re-tune existing DSRC equipment to operate exclusively in the top 30 megahertz of the band. It is not reasonable for the very companies that have allowed the 5.9 GHz band to lay fallow for decades to expect the Commission to fund their purchase of new equipment or their cost (if any) to re-tune existing equipment. These interests have had the extraordinary benefit of exclusive access to mid-band spectrum without an auction or buildout requirements for 20 years. Moreover, American taxpayers subsidized their experimentation with the band throughout this period, through millions and millions of dollars of state and federal grants. Despite these advantages and subsidies, they failed to bring the country the deployment that they promised. Even now, the Commission has provided DSRC licensees with more than adequate spectrum resources to continue the few existing DSRC pilot projects in the upper 30 megahertz of the band.

The Commission also should reject amorphous proposals by certain ITS proponents to require some form of “compensation” to DSRC licensees from consumers purchasing Wi-Fi equipment.⁶² The Commission found in the *First Report and Order* that existing licensees can “[r]econfigur[e] DSRC-based devices by updating firmware and/or software” to operate in the

⁶¹ See, e.g., Press Release, U.S. Department of Transportation, Federal Highway Administration, U.S. Department of Transportation Awards \$43.3 Million in Advanced Transportation and Congestion Management Technologies Grants (June 16, 2020), <https://cms8.fhwa.dot.gov/newsroom/us-department-transportation-awards-433-million-advanced-transportation-and-congestion> (approximately \$7 million to the Hawaii DOT for “Implementing Cellular V2X Technology to Improve Safety and ITS Management in Hawaii”).

⁶² See *First Report and Order* ¶ 57.

top 30 megahertz.⁶³ The incidental costs of retuning that existing equipment, if any, do not require or warrant compensation. For one thing, the operators of existing pilots are typically engaged in testing DSRC in an effort to demonstrate the feasibility of the technology,⁶⁴ not licensees that have built networks positioned for long-term operation with substantial existing user bases. Parties intending to build out their pilots to full C-V2X deployments will have the same ability to do so they had before with DSRC. Further, unlike in contexts such as the Commission’s recent repurposing of C-band spectrum for licensed 5G deployments, DSRC pilots here do not require new equipment or additional deployments in order to provide substantially the same service they currently do—the Commission already found that they can do so in the top 30 megahertz with simple upgrades.⁶⁵

Even if there were legitimate compensable costs, which there are not, those costs are directly related to the “transition of the band to C-V2X,”⁶⁶ not to the unlicensed operations in the lower part of the band. As the Commission found in the *First Report and Order*, there is “minimal current deployment of DSRC.”⁶⁷ And in the very near future—likely “two years after the effective date of a Second Report and Order adopted in response to” the *FNPRM*—those sparse existing DSRC operations will have to either “convert to C-V2X or cease operating.”⁶⁸ It would be arbitrary and unreasonable for the Commission to require individual purchasers of unlicensed equipment or the broadband providers, companies, schools, libraries, and hospitals

⁶³ *Id.* ¶ 119.

⁶⁴ *See id.* ¶ 57.

⁶⁵ *Id.* ¶ 119.

⁶⁶ *FNPRM* ¶ 147.

⁶⁷ *First Report and Order* ¶ 119.

⁶⁸ *FNPRM* ¶ 147.

that provide Wi-Fi networks to pay existing operators for access to the U-NII-4 band, particularly after DSRC licensees failed to make meaningful use of the band for 20 years. There is no reasonable mechanism for collecting a levy on these individuals and entities, and no legal structure for them to make a payment to the Commission. In short, DSRC interests have asked for an inappropriate and impracticable payout that the Commission should decline.

B. A Safety-Only Rule for C-V2X Is the Only Justification for Granting Licensees Access to Valuable Spectrum with No Auction and No Sharing Responsibilities.

The Commission’s decision 20 years ago to reserve the 5.9 GHz band for the exclusive use of DSRC operators, with no auction, would be anomalous today. The Commission’s decision in the *First Report and Order* to continue with that approach from 5.895-5.925 GHz, but with C-V2X instead of DSRC, is justifiable only given the Commission’s expectation that this new technology will deliver the vehicular-safety benefits ITS proponents have promised for decades.⁶⁹ But the opportunity costs of such a decision have changed significantly since 1999, as mid-band spectrum is now in high demand for important unlicensed applications and for flexible-use licensed services. The only possible justification for licensees to gain access to this extremely valuable spectrum without an auction, and without any obligation to share the spectrum broadly with non-C-V2X users, is to deliver safety-of-life services. The transition to C-V2X may be the only opportunity for the Commission to ensure that licensees use the spectrum for that purpose, rather than for the many other commercial applications they have previously planned.⁷⁰

⁶⁹ See *First Report and Order* ¶ 26.

⁷⁰ See NCTA Comments at 22-23 (describing plans of DSRC and C-V2X advocates to use 5.9 GHz spectrum for commercial applications such as “infotainment”).

When NCTA previously raised these arguments, ITS proponents did not object to restricting the band to safety-critical uses.⁷¹ To the contrary, in the run-up to the Commission’s adoption of the *First Report and Order*, ITS proponents consistently emphasized how the Commission should, for example, “help accelerate the delivery of C-V2X safety services to American travelers.”⁷² Indeed, many ITS advocates call these frequencies the “Safety Band.”

In comments responding to the *NPRM*, ITS advocates did not respond meaningfully to the Commission’s request that they enumerate the specific functions that provide safety-of-life protection and cannot use spectrum outside 5.9 GHz.⁷³ The Commission should continue to seek clarity regarding which contemplated functions are for safety of life and which are not. And given the past representations by ITS advocates, and the asserted public-safety justification, the Commission should restrict C-V2X operations to safety only.⁷⁴

C. The Commission Should Adopt an OOB Limit for C-V2X Operations that Ensures They Do Not Interfere with Home, School, and Business Broadband.

The Commission’s rules should ensure that the spectrum environment in the 5.9 GHz band is hospitable both for the licensed users in the 5.895-5.925 GHz band and for the unlicensed users in adjacent spectrum. The Commission has clear authority to establish technical rules for a licensed band that advance its policy decisions in the *First Report and Order* that unlicensed technologies in U-NII-4 are important for advancing broadband access across the United States.⁷⁵ Individual users of unlicensed equipment must accept interference from individual

⁷¹ See NCTA Reply Comments at 18-20.

⁷² Letter from Sean T. Conway, Counsel, 5G Automotive Association, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-138, at 2 (filed Nov. 10, 2020).

⁷³ See NCTA Reply Comments at 18-19.

⁷⁴ See *FNPRM* ¶ 168.

⁷⁵ See *First Report and Order* ¶¶ 14, 20.

users of licensed equipment.⁷⁶ But this does not require the Commission to adopt rules for a licensed band that would undermine its policy to support service in an adjacent unlicensed band.

Sensible OOB limits for C-V2X will, as the Commission notes, provide C-V2X “equipment manufacturers with clear guidelines for equipment approval compliance” and “ensure compatibility with adjacent U-NII devices in both the U-NII-4 and U-NII-5 bands.”⁷⁷ And because C-V2X licensees will be newly accessing the 5.9 GHz band or newly deploying C-V2X equipment based on rules the Commission adopts, now is the time to ensure that those licensees use reasonable filtering in furtherance of the Commission’s goals for the ITS band and the adjacent U-NII bands.

C-V2X interests’ push for unreasonably relaxed OOB limits⁷⁸ threatens to undermine Wi-Fi across the country. Rather than adopt those limits, which could erode reliance on Wi-Fi in the new U-NII-4 band by millions of Americans in homes, schools, healthcare centers, and businesses across the country, the Commission should adopt its proposed OOB limits for C-V2X,⁷⁹ which are sufficient for C-V2X operations and support compatibility with adjacent U-NII operations. Indeed, as the Commission points out, they are the limits 5GAA has previously requested for C-V2X operations.⁸⁰ With C-V2X devices just entering the band, and

⁷⁶ See 47 C.F.R. § 15.5(b).

⁷⁷ FNPRM ¶¶ 163-64.

⁷⁸ See Comments of the 5G Automotive Association at App’x A, A-8-9, A-11-12, ET Docket No. 19-138 (filed Mar. 9, 2020); Letter from Sean T. Conway, Counsel, 5G Automotive Association, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 19-138, at 1-2 (filed Sept. 2, 2020).

⁷⁹ FNPRM ¶ 163.

⁸⁰ *Id.* ¶ 163 n.434.

with unlicensed operators required to accept interference from other operators in compliance with the Commission's rules, the Commission should not waver in its proposed approach.

VI. CONCLUSION

The Commission took an important step forward for next-generation broadband in the *First Report and Order*. NCTA commends the Commission for seeking comment in the *FNPRM* on how to continue that progress while establishing protections for co-channel federal operations and adjacent ITS operations. Consumers have already realized benefits from unlicensed operations in U-NII-4 through the Commission's authorization of STAs, and the even-greater benefits of widespread indoor U-NII-4 operations will soon follow. NCTA encourages the Commission to act promptly to make flexible outdoor operations, including a robust ecosystem of new U-NII-4-capable portable devices, possible once the sparse existing ITS operations transition to the top of 5.9 GHz.

Respectfully submitted,



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