

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

In the Matter of
Facilitating Shared Use in the 3100-3550 MHz Band
WT Docket No. 19-348

SECOND REPORT AND ORDER, ORDER ON RECONSIDERATION, AND ORDER OF PROPOSED MODIFICATION

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By the Commission: Acting Chairwoman Rosenworcel and Commissioner Starks issuing separate statements, Commissioner Carr and Commissioner Simington approving in part, concurring in part and issuing separate statements

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I. INTRODUCTION

1. Today, the Commission takes steps to advance Congressional and Commission objectives to make more mid-band spectrum available for fifth generation wireless services, or 5G. Specifically, we begin implementation of the Beat China by Harnessing Important, National Airwaves for 5G Act of 2020 (Beat CHINA for 5G Act of 2020), which requires the Commission to start an auction to grant new initial licenses subject to flexible use in the 3450-3550 MHz (3.45 GHz) band by December 31, 2021. Together with its federal partners in the Executive Branch, including the White House Office of Science and Technology Policy and National Economic Council, the National Telecommunications and Information Administration (NTIA), and the Department of Defense (DoD), the Commission has worked with unprecedented speed and collaboration to make 100 megahertz of mid-band spectrum in the 3.45 GHz band available for flexible use. The framework we adopt today will enable full-power commercial use¹ of this band and require that future licensees deploy their networks quickly, so that that this spectrum is in put in service of the American people. We also take steps to balance the needs of federal incumbents where and when they require continued access to the band and relocate important non-federal weather forecasting services so that they are not adversely impacted by our actions. Collectively, the 3.45 GHz band and the neighboring 3.5 GHz and 3.7 GHz bands will offer 530 megahertz of contiguous mid-band spectrum for 5G services.

II. BACKGROUND

2. During the last few years, standards setting organizations and other countries have focused on the 3.3-3.55 GHz band as a core, globalized band for 5G use.² Portions of this band are

¹ References to commercial use in this item refer to non-federal, primary, flexible use of the 3.45 GHz band and do not preclude use of the band for private mobile radio services. See 47 U.S.C. § 332(d)(3); 47 CFR § 20.3.

² For example, Australia has licensed spectrum in the 3.425-3.4925 GHz and 3.5425-3.575 GHz ranges for 5G and is looking at reconfiguring the 3.4-3.575 GHz band in order to make more spectrum available for wireless broadband. See Australian Communications and Media Authority, *Optimising the 3400-3375 MHz Band – Consultation 12/2019* (2019), <https://www.acma.gov.au/consultations/2019-08/optimising-3400-3575-mhz-band-consultation-122019>. In Canada, an auction of spectrum in the 3.45-3.65 GHz range is scheduled to begin on June 15, 2021. Innovation, Science and Economic Development Canada, 3500 MHz band Spectrum Auction, <https://www.canada.ca/en/innovation-science-economic-development/news/2020/03/3500-mhz-band-spectrum-auction.html>. China has awarded 5G licenses to two mobile network operators in the 3.4-3.6 GHz band. Ministry of Industry and Information Technology of China, China 5G Development and Policy at 5 (2019), <https://static1.squarespace.com/static/5bf2b77d75f9eefcd937cb5c/t/5d1a20eb11a9570001f95d65/1561993455970/5.+Julin+LIU.pdf>. The French telecommunications regulator, ARCEP, auctioned 5G licenses in the 3.4-3.8 GHz band in October 2020. ARCEP, *Final Results of the Award Procedure for 3.4 – 3.8 GHz Band Spectrum* (Nov. 4, 2020), <https://en.arcep.fr/news/press-releases/p/n/5g-7.html>. In Germany, an auction of the 3.4-3.7 GHz range (for nationwide use) was completed in June 2019. Bundesnetzagentur, Frequency auction 2019, https://www.bundesnetzagentur.de/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Breitband/MobilesBreitband/Frequenzauktion/2019/Auktion2019.html?nn=267664. Hong Kong completed an auction of the 3.4-3.6 GHz band in October 2019. Office of the Communications Authority, *Successful Conclusion of Auction of 5G Spectrum in the 3.5 GHz Band* (Oct. 14, 2019), https://www.ofca.gov.hk/en/media_focus/press_releases/index_id_2005.html. Although Italy had previously

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already globally harmonized or in the process of being studied for that purpose. There has been a broad and consistent effort by international governing bodies and global standards setting organizations to review the suitability of several frequency bands for next-generation 5G wireless services, including the lower 3 GHz band. The International Telecommunication Union (ITU) has allocated portions of the 3 GHz band for primary fixed and secondary mobile use in all three ITU regions.³ 3GPP, the global industry standards organization for mobile technology, has specified two spectrum operating bands for 5G that overlap with the 3.45 GHz band: band n77 between 3.3-4.2 GHz, and band n78 between 3.3-3.8 GHz.⁴ In addition, the Radio Spectrum Committee of the European Commission issued a mandate to the European Conference of Postal and Telecommunications Administrations (CEPT) that the 3.4-3.8 GHz band be the first primary band for 5G.⁵ Further, CEPT released a report that recommends updating the European regulatory framework for this band to support introducing 5G wireless systems.⁶

3. Congress addressed the pressing need for additional spectrum in the United States to support broadband, including mid-band spectrum, in the Fiscal Year 2018 omnibus spending bill, which included the Making Opportunities for Broadband Investment and Limiting Excessive and Needless Obstacles to Wireless Act (MOBILE NOW Act) under Title VI of RAY BAUM'S Act.⁷ The MOBILE NOW Act mandated that the Secretary of Commerce, working through NTIA: (1) submit, in consultation with the Commission and the head of each affected federal agency (or a designee thereof), a report by March 23, 2020, on the feasibility of "allowing commercial wireless service, licensed or unlicensed, to

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licensed the 3.4-3.6 GHz band for WiMAX services, AGCOM is considering whether to reconfigure the band into a TDD arrangement, which would be suitable for 5G. *5G Mid-Band Spectrum Report* at A-15. Japan licensed the 3.48-3.6 GHz band in December 2018. *5G Mid-Band Spectrum Report* at A-17. In February 2018, Qatar assigned two 100 MHz licenses for 5G services in the 3.4-3.6 GHz band. Communications Regulatory Authority, *The Preliminary Frequency Bands Plans for 5G Mobile Services* (Feb. 22, 2018), <https://cra.gov.qa/document/the-preliminary-frequency-bands-plans-for-5g-mobile-services>. In 2018, licenses in the 3.42-3.7 GHz range were auctioned in South Korea for 5G use. *5G Mid-Band Spectrum Report* at A-21. Spain has already licensed spectrum in the 3.4-3.6 GHz band for 5G use. Ministry of Economy and Business, *Informative note on the 3600-3800 MHz band spectrum auction* (July 24, 2018), https://portal.mineco.gob.es/en-us/comunicacion/Pages/180717_np_Subasta5G.aspx. Sweden approved four applicants for participation in an auction of licenses in the 3.4-3.8 GHz band for 5G in November 2020. Swedish Post and Telecom Authority, *Four companies approved for participation in the 3.5 GHz and 2.3 GHz auctions* (Oct. 20, 2020), <https://www.pts.se/en/news/press-releases/2020/four-companies-approved-for-participation-in-the-3.5-ghz-and-2.3-ghz-auctions/>. The United Kingdom completed an auction of licenses in the 3.4-3.6 GHz band in 2018. OFCOM, *Award of 2.3 and 3.4 GHz Spectrum by Auction* (Apr. 25, 2018), <https://www.ofcom.org.uk/spectrum/spectrum-management/spectrum-awards/awards-archive/2-3-and-3-4-ghz-auction>.

³ See 47 CFR § 2.106 (allocating 3400-3600 MHz for fixed and mobile, except aeronautical mobile, in all three ITU regions, and 3300-3400 MHz for fixed and mobile in Region 2).

⁴ 3GPP TS 38.104, NR; Base Station (BS) Radio Transmission and Reception. Note: 3GPP specifications refer to 5G as New Radio (NR).

⁵ See European Commission Directorate-General for Communications Networks Content & Technology, Radio Spectrum Committee, Opinion of the RSC: Mandate to CEPT to develop harmonised technical conditions for spectrum use in support of the introduction of next-generation (5G) terrestrial wireless systems in the Union, RSCOM16-40rev3 (Dec. 7, 2016) available at http://ec.europa.eu/newsroom/document.cfm?doc_id=42093.

⁶ See European Conference of Postal and Telecommunications Administrations, CEPT Report 67 (2019), <https://docdb.cept.org/download/561367fd-1ac6/CEPT%20Report%2067.pdf>; see also European Conference of Postal and Telecommunications Administrations, CEPT Roadmap for 5G (Mar. 2019), [https://cept.org/files/18334/ECC\(19\)042%20Annex%2032_CEPT%20Roadmap%205G.docx](https://cept.org/files/18334/ECC(19)042%20Annex%2032_CEPT%20Roadmap%205G.docx).

⁷ See Consolidated Appropriations Act, 2018, Pub. L. 115-141, Division P, the Repack Airwaves Yielding Better Access for users of Modern Services (RAY BAUM'S) Act, Title IV (the Making Opportunities for Broadband Investment and Limiting Excessive and Needless Obstacles to Wireless Act or MOBILE NOW Act).

share use of the frequencies between 3100 megahertz and 3550 megahertz,”⁸ and (2) identify, with the Commission, “at least 255 megahertz of Federal and non-Federal spectrum for mobile and fixed wireless broadband use” by December 31, 2022.⁹

4. Shortly before Congress enacted the 2018 omnibus spending bill, NTIA announced that it had identified the 3.45 GHz band for study for potential repurposing to spur commercial wireless innovation.¹⁰ NTIA identified the top 100 megahertz in the 3.1-3.55 GHz band as the most promising portion for sharing in the near term, but it confirmed in July 2019 that it was conducting an assessment, in collaboration with the DoD,¹¹ on the feasibility of sharing in the entire 3.1-3.55 GHz band.¹² In January 2020, NTIA released its feasibility study, which found, subject to further analysis, that spectrum sharing that provides both sufficient protection to incumbent operations and attractive opportunities for commercial business appeared feasible in the 3450-3550 MHz band.¹³

5. In July 2020, NTIA submitted a report to Congress, pursuant to the MOBILE NOW Act, that examined the shared use of spectrum between federal incumbents and commercial wireless services in the 3.1-3.55 GHz band under the assumption that there would be no changes to incumbent operations.¹⁴ The report concluded that the 3.45 GHz band “is a good candidate for potential spectrum sharing, including at the commercial system power levels sought by the wireless industry.”¹⁵ The report further concluded that some sharing below 3.45 GHz might be possible, but that additional analysis of the entire band would be necessary to assess the various sharing mechanisms and to determine whether incumbent

⁸ MOBILE NOW Act § 605(a).

⁹ *Id.* § 603(a).

¹⁰ The 3100-3500 MHz band was initially identified as a potential band for spectrum sharing in NTIA’s 2010 Ten Year Plan, *see* NTIA, Plan and Timetable to Make Available 500 Megahertz of Spectrum for Wireless Broadband (2010), https://www.ntia.doc.gov/files/ntia/publications/tenyearplan_11152010.pdf, and in 2016, NTIA’s Quantitative Assessment found that potential opportunities for sharing spectrum existed in the 3505-3550 MHz band, *see* NTIA, Quantitative Assessments of Spectrum Usage (2016), https://www.ntia.gov/files/ntia/publications/ntia_quant_assessment_report-no_appendices.pdf. NTIA’s 2020 Report called for further studies but acknowledged that the 3450-3550 MHz band may be suitable for sharing. *See* Edward Drocella *et al.*, Technical Feasibility of Sharing Federal Spectrum with Future Commercial Operations in the 3450-3550 MHz Band, NTIA Technical Report 20-546 (Jan. 2020), <https://www.ntia.gov/report/2020/technical-feasibility-sharing-federal-spectrum-future-commercial-operations-3450-3550>.

¹¹ *Our Wireless Future: Building a Comprehensive Approach to Spectrum Policy: Hearing Before the Subcomm. On Comms. And Technology of the H. Comm. on Energy and Commerce*, 116th Cong. (July 16, 2019) (Testimony of Derek Khlopin, Senior Policy Advisor, NTIA) (“We started aggressively looking at [the 3.1-3.55 GHz] range, what we found in the short-term is the upper 100, the 3450-3550, presents the opportunity in the near-term to make spectrum available. Having said that, we’ll continue to look for the larger block as well . . . [w]e’re very, very optimistic about it.”); *see also* Keith Gremban, ITU Adopts NTIA Software as Global Standard for Coordinating Spectrum Sharing (May 29, 2019), <https://www.ntia.doc.gov/blog/2019/itu-adopts-ntia-software-global-standard-coordinating-spectrum-sharing> (“[NTIA] software also is being used to assess feasibility of spectrum sharing in the 3.45 to 3.55 GHz band, which is under study for sharing with military radars.”).

¹² *See* U.S. Dept. of Commerce, Annual Report on the Status of Spectrum Repurposing at 20 (Aug. 2019), <https://go.usa.gov/xparp>.

¹³ Edward Drocella *et al.*, Technical Feasibility of Sharing Federal Spectrum with Future Commercial Operations in the 3450-3550 MHz Band, NTIA Technical Report 20-546 (Jan. 2020), <https://www.ntia.gov/report/2020/technical-feasibility-sharing-federal-spectrum-future-commercial-operations-3450-3550>.

¹⁴ Wilber L. Ross *et al.*, Feasibility of Commercial Wireless Services Sharing with Federal Operations in the 3100-3550 MHz Band at 1 (July 2020) (NTIA July 2020 Report), https://www.ntia.doc.gov/files/ntia/publications/ntia_3100-3550_mhz_mobile_now_report_to_congress.pdf.

¹⁵ *Id.*

relocation of operations below 3.45 GHz is possible.¹⁶ The report recommended moving forward with a focus on four principal efforts for the full 3.1-3.55 GHz band: (1) a more in-depth assessment of the extent to which each of the federal systems is used; (2) the development of a reliable mechanism for commercial operations to coordinate when federal systems are operating; (3) assessment of the potential for relocating federal systems, such as nationwide airborne systems; and (4) consideration of improved out-of-band emission limits for future commercial operations in the band.¹⁷ As directed by section 605(d) of the MOBILE NOW Act, the Commission sought comment on the July 2020 NTIA report and specifically on its findings concerning possible sharing of the 3.45 GHz band with commercial wireless services.¹⁸ No commenters specifically addressed the July 2020 NTIA report in their comments.

6. In 2020, the White House and the DoD formed the America's Mid-Band Initiative Team (AMBIT), with the goal of making 100 megahertz of contiguous mid-band spectrum available in the 3.45 GHz band for commercial use.¹⁹ Under the agreement that was reached as part of the AMBIT process, the DoD expected to enable commercial 5G systems to operate at full power throughout almost all the contiguous United States by: (1) adjusting its concept of operations within the band; (2) coordinating network planning with new commercial operators in certain areas near the DoD's operations; (3) periodically coordinating with new commercial operators for use of the spectrum during certain discrete time periods in specific areas; (4) relocating certain airborne systems out of the band; and (5) developing and deploying a supplemental radar capacity that operates outside the band.²⁰ The study also concluded that the DoD would require access to the spectrum during times of national emergency.²¹

7. In December 2020, Congress adopted the Beat CHINA for 5G Act of 2020. The Act requires NTIA, no later than June 25, 2021, to "begin the process of withdrawing or modifying the assignments to Federal Government stations of the [3.45 GHz band] as necessary" for the Commission to reallocate and auction the band for flexible commercial use.²² The Act further requires the Commission to "begin a system of competitive bidding . . . to grant new initial licenses for the use of a portion or all of the [3.45 GHz band], subject to flexible-use service rules," no later than December 31, 2021.²³ Finally, the Act provides an exemption to the 18-month FCC auction notification requirement in the Commercial Spectrum Enhancement Act.²⁴

8. *Current Allocation and Use of the 3.45 GHz Band and Adjacent Bands.*—The 3.45 GHz band currently is allocated on a primary basis for federal radiolocation services.²⁵ The 3.5-3.55 GHz

¹⁶ *Id.*

¹⁷ *Id.* at 10-11.

¹⁸ *Facilitating Shared Use in the 3100-3550 MHz Band*, WT Docket No. 19-348, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 11078, 11093-94, para. 44 (2020) (*3.45 GHz R&O and FNPRM*); *see also* MOBILE NOW Act § 605(d).

¹⁹ *See 3.45 GHz R&O and FNPRM*, 35 FCC Rcd at 11082, para. 12.

²⁰ Letter from Charles Cooper, Associate Administrator, NTIA, to Ronald T. Repasi, Acting Chief, OET, FCC and Donald Stockdale, Chief, WTB, FCC, WT Docket No. 19-348, at 2-3 (filed Sept. 8, 2020) (NTIA 2020 *Ex Parte* Letter).

²¹ *Id.* at 2.

²² Beat CHINA for 5G Act of 2020 § 905(c)(1).

²³ *Id.* § 905(d)(1)(B).

²⁴ *Id.* § 905(d)(2); 47 U.S.C. § 923(g)(4)(A).

²⁵ *See* 47 CFR § 2.106.

portion of that band also is allocated for federal aeronautical radionavigation services on a primary basis.²⁶

9. Until now, the 3.45 GHz band has been predominantly a federal band with limited non-federal use of the band. The band is situated within the 3.1-3.55 GHz band, which is designated for both federal and non-federal radiolocation services. Currently, the 3.45 GHz band is used by federal radiolocation services that operate on a primary basis, with non-federal radiolocation users operating on a secondary basis.²⁷ The federal radiolocation allocation in this band is one part of a broader federal primary allocation for radiolocation in the 2.9-3.65 GHz band.²⁸ The DoD operates high- and low-powered defense radar systems on a variety of platforms in the 3 GHz band, including fixed, mobile, shipborne, and airborne operations.²⁹ Among the non-federal users operating in the 3.1-3.55 GHz band are holders of hundreds of non-federal experimental licenses, including special temporary authorizations (STAs).³⁰ These non-federal experimental licensees are not protected from harmful interference from the operation of the primary federal users and secondary non-federal users, and they may not cause interference to the primary federal users and secondary non-federal users.

10. From 3.1-3.3 GHz, the band is allocated on a secondary basis for federal and non-federal space research (active) and earth exploration satellite (active). These allocations are in addition to the primary allocation for federal radiolocation services, and the secondary allocation for non-federal radiolocation services.³¹ There are 17 non-federal radiolocation licenses in the portion of the band below 3.3 GHz, which are held by power companies and municipalities.³² Between 3.3 and 3.55 GHz, there are only seven active non-federal radiolocation licenses, which are used for several different commercial and industrial radiolocation services.³³ For example, some licensees employ Doppler radar to provide weather

²⁶ See *id.*

²⁷ See 47 CFR § 2.106 and US108; *id.* § 90.103(b), (c)(12). The Commission removed the secondary, non-federal allocations from the 3.3-3.55 GHz band in the *First Report and Order*. However, it allowed secondary non-federal licensees operating as of the effective date of the *First Report and Order* to continue to operate in the 3.45 GHz band while the Commission finalized plans to reallocate spectrum in the band. See *Facilitating Shared Use in the 3100-3550 MHz Band*, WT Docket No. 19-348, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 11078, 11085-86, para. 19 (2020) (*3.1-3.55 GHz R&O and FNPRM*).

²⁸ 47 CFR § 2.106.

²⁹ See NTIA Compendium of Federal Spectrum Use, <https://www.ntia.doc.gov/other-publication/2017/federal-government-spectrum-compendium>; NTIA Special Publication 00-40, Federal Radar Spectrum Requirements at 26 (May 2000) (explaining why certain radar systems are in certain bands), <https://www.ntia.doc.gov/report/2000/federal-radar-spectrum-requirements>.

³⁰ The total number of active experimental authorizations is always changing. Experimental STAs, for example, may be requested for a temporary period of no longer than six months. See 47 CFR §§ 5.54(a)(2), 5.61. Current active experimental authorizations throughout the 3.1-3.55 GHz band can be found via the Office of Engineering and Technology's Experimental Licensing System Generic Search, <https://apps.fcc.gov/oetcf/els/reports/GenericSearch.cfm>. We note that the Commission's 2019 *Report and Order* did not alter, nor are we altering here, our existing rules for experimental use of the 3.45 GHz band. See *3.1-3.55 GHz R&O and FNPRM*. Thus, experimental license applicants will continue to have access to the band to conduct experimentation consistent with our rules. See 47 CFR §§ 1.931; 5.1 *et seq.* Applications for experimental licenses, including STAs, will be considered by the Commission and coordinated with NTIA consistent with our rules. See Aerospace Industries Association Reply at 1 (asking for reliable and continued access the spectrum in the 3100-3550 MHz range to conduct testing supporting radars and other advanced systems).

³¹ See 47 CFR § 2.106.

³² Specifically, Alabama Power Company holds eight licenses, Georgia Power Company holds seven, and the city and county of Denver/Denver International Airport hold two.

³³ Since the *FNPRM*, one licensee, the Town of Warrensburg, New York, cancelled its license. Of the seven remaining licenses, NBC Telemundo License LLC holds three, and Station Venture Operations, LP, I.O.U.

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information to broadcast viewers; others provide security radar service to critical infrastructure entities. In addition, non-federal amateur services operate in the 3.3-3.5 GHz portion of the band under a secondary allocation,³⁴ and the Radio Astronomy Service operates on 3260-3267 MHz, 3332-3339 MHz, and 3345.8-3352.5 MHz.³⁵ The primary allocation for federal radiolocation operations continues below 3.1 GHz, with secondary non-federal radiolocation operations in this spectrum as well.

11. The Commission has authorized the band immediately above 3.1-3.55 GHz for commercial wireless operations. In 2015, the Commission established the Citizens Broadband Radio Service in the 3.55-3.7 GHz band (3.5 GHz band) for shared use between commercial wireless operations and incumbent operations—including military radar systems, non-federal FSS earth stations, and, for a limited time, grandfathered wireless broadband licensees in the 3.65-3.7 GHz band.³⁶ To facilitate the Citizens Broadband Radio Service sharing arrangement, the Commission established a three-tier access and authorization framework, consisting of Incumbent Access, Priority Access, and General Authorized Access (GAA) users.³⁷ Several entities have already deployed in the GAA tier, which is licensed-by-rule throughout the 150 megahertz of the 3.5 GHz band.³⁸ Bidding in Auction 105—the auction of Priority Access Licenses (PALs) in the Priority Access tier of the 3.5 GHz band—closed on August 25, 2020.³⁹ The Commission currently is in the process of reviewing long-form applications.⁴⁰

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Acquisitions, Air-Tel, LLC, and Nexstar Broadcasting, Inc each hold one. We note that these licenses only authorize the licensees to provide radiolocation service and should the licensee use the frequency band for other services, enforcement action may result. See *IOU Acquisitions, Inc., Air-Tel, LLC*, Notice of Apparent Liability for Forfeiture, 33 FCC Rcd 8919 (2018) (*Air-Tel and IOU NAL*). The present rulemaking is without prejudice to any enforcement proceeding. Although the Commission removed the secondary, non-federal allocations from the 3.3-3.55 GHz band in the *First Report and Order*, it allowed secondary non-federal licensees operating as of the effective date of the *First Report and Order* to operate in the 3.45-3.55 GHz band during the pendency of this proceeding. See *3.1-3.55 GHz R&O and FNRPM*, 35 FCC Rcd at 11085-86, para. 19.

³⁴ Non-federal amateur services operating in the 3.3-3.5 GHz portion of the band must not cause harmful interference to operations such as radio astronomy stations and stations authorized by other nations for radiolocation service. See 47 CFR §§ 2.106, 97.303(d), (f).

³⁵ *Id.* § 2.106, US Footnote 342. This footnote indicates that all practicable steps should be taken to protect the Radio Astronomy Service from harmful interference in these bands.

³⁶ See *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, Report and Order and Second Further Notice of Proposed Rulemaking, 30 FCC Rcd 3959 (2015) (*3.5 GHz R&O and FNRPM*).

³⁷ *3.5 GHz R&O and FNRPM*, 30 FCC Rcd at 3962, para. 4. Incumbent users receive interference protection from Citizens Broadband Radio Service users; Priority Access operations receive protection from GAA operations; and GAA operations receive no interference protection from other Citizens Broadband Radio Service users.

³⁸ *Id.* Specifically, the Commission concluded that a maximum of 70 megahertz may be reserved for Priority Access Licensees (PALs) in any given license area and the remainder of the available frequencies would be made available for GAA use. *Id.* at 3981, para. 63. Under this approach, GAA users would potentially have access to all 150 megahertz in the band in areas where there are no PALs issued or in use and up to 80 megahertz where all PALs are in use. *Id.* at 3981, 64.

³⁹ See *Auction of Priority Access Licenses in the 3550-3650 MHz Band Closes*, Public Notice, 35 FCC Rcd 9287 (WTB 2020).

⁴⁰ See *Wireless Telecommunications Bureau Announces that Applications for Auction 105 Licenses are Accepted for Filing*, Public Notice, 35 FCC Rcd 14080 (WTB 2020); *Wireless Telecommunications Bureau Announces Additional Applications*, Public Notice, DA 21-84 (WTB Jan. 19, 2021).

12. In addition, in February 2020, the Commission established the 3.7 GHz Service in the 3.7-4.2 GHz band (C-Band) for flexible use.⁴¹ Within the C-band, the 3.7-4.0 GHz portion of the band is allocated for mobile use,⁴² while the 4.0-4.2 GHz portion continues to be allocated for FSS operations. The 3.98-4.0 GHz portion will serve as a guard band while existing satellite operations are repacked into the upper 200 megahertz of the band (4.0-4.2 GHz).⁴³ The Commission began auctioning the 280 megahertz (3.7-3.98 GHz) flexible-use portion for wireless services in the contiguous United States on December 8, 2020.⁴⁴ The clock phase of bidding in the C-band auction (Auction 107) closed on January 26, 2021.⁴⁵

13. *Procedural History.*—In light of the statutory provisions contained in the MOBILE NOW Act,⁴⁶ the Wireless Telecommunications Bureau in February 2019 suspended the acceptance of applications for new or expanded part 90 Radiolocation Service operations in the 3.1-3.55 GHz band in order to “maintain a stable spectral environment in a band that is under active consideration for possible alternative use.”⁴⁷ The Commission issued a *Notice of Proposed Rulemaking* in December 2019 proposing to clear non-federal secondary allocations from the 3.3-3.5 GHz band as a preliminary step toward potential future shared use between federal incumbents and commercial users of the band.⁴⁸ In June 2020, the Commission, consistent with the Commercial Spectrum Enhancement Act, notified NTIA of its plan to commence an auction in 2021 for licenses in 100 megahertz of the 3400-3550 MHz band.⁴⁹

14. In September 2020, the Commission released a *Report and Order and Further Notice of Proposed Rulemaking*. The *Report and Order* adopted the Commission’s 2019 proposal to remove the

⁴¹ See *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, GN Docket No. 18-122, Report and Order and Order of Proposed Modification, 35 FCC Rcd 2343 (2020) (*3.7 GHz Service Order*), *aff’d PSSI Global Services v. FCC*, No. 20-1142 (D.C. Cir. Dec. 8, 2020) (per curiam).

⁴² *Id.* at 2370, para. 54.

⁴³ *Id.* at 2358, para. 31.

⁴⁴ *Id.* at 2353, para. 22.

⁴⁵ *Close of Clock Phase Bidding in Auction 107 (3.7 GHz Service)*, AU Docket No. 20-25, DA 21-80 (OEA/WTB Jan. 26, 2021).

⁴⁶ As previously discussed, the MOBILE NOW Act requires NTIA and the Commission to identify at least 255 megahertz of Federal and non-Federal spectrum for mobile and fixed wireless broadband use by December 31, 2022.

⁴⁷ *Temporary Freeze on Non-Federal Applications in the 3100-3550 MHz Band*, WT Docket No. 19-39, Public Notice, 34 FCC Rcd 19 (WTB Feb. 22, 2019) (*3.1-3.55 Freeze PN*). Two pending applications for new stations are subject to this freeze. See Application of Fort Myers Broadcasting Company, ULS File No. 0008282472 (filed July 12, 2018); Application of Southern California Edison Company, ULS File No. 0008495115 (filed Jan. 17, 2019). Dynetics, Inc., filed requests for modification and waiver of the freeze to allow certain continued operations in the 3.1-3.3 GHz band; these petitions remain pending. See Dynetics, Inc. Request for Modification of Temporary Freeze on Non-Federal Applications in the 3100-3550 MHz Band, WT Docket No. 19-39 (filed May 17, 2019); Dynetics, Inc. Request for Limited Waiver of Temporary Freeze on Non-Federal Applications in the 3100-3550 MHz Band, WT Docket No. 19-39 (filed May 17, 2019). Dynetics reiterates its request in its comments. See Dynetics Comments at 3-4.

⁴⁸ *Facilitating Shared Use in the 3.1-3.55 GHz Band*, WT Docket No. 19-348, Notice of Proposed Rulemaking, 34 FCC Rcd 12662 (2019) (*3.1-3.55 GHz NPRM*). The Commission sought comment on what alternative spectrum would be available for non-federal incumbents’ future operations, what transition mechanisms would be appropriate, what the cost of relocating those secondary operations might be, if and how relocating operations should be compensated, and whether their secondary status should affect the extent or nature of their compensation for relocation.

⁴⁹ 47 U.S.C. § 923(g)(1)-(2), (4). As noted above, the Beat CHINA for 5G Act later obviated the need for any such notification. Beat CHINA for 5G Act of 2020 § 905(d)(2).

secondary, non-federal allocations from the 3.3-3.55 GHz band.⁵⁰ The *FNPRM* proposed: (1) allocation changes to the 3.3-3.55 GHz band to enable future commercial use; (2) coordination between future flexible-use licensees and federal incumbents that remain in the band; (3) relocation logistics for non-federal secondary users; and (4) the technical, licensing, and operating rules that would create a successful coordination regime both within the band and with federal and non-federal operations in adjacent bands.⁵¹

III. SECOND REPORT AND ORDER

15. In this Second Report and Order, we establish rules to create a new 3.45 GHz Service operating between 3.45-3.55 GHz. By creating service and technical rules for this band that will enable operators to provide full power commercial operations, we promote the public interest by making this valuable mid-band spectrum available for next-generation use. The 3.45 GHz Service will provide licensees maximum flexibility in deploying networks and offering services, while still protecting remaining federal operations when and where necessary. The Commission is continuing to work with NTIA and other federal agencies on potential opportunities for commercial use of some or all of the remainder of the 3.1-3.55 GHz band and may consider additional actions in a future Further Notice of Proposed Rulemaking.

16. The record in this proceeding reflects the importance of the 3.45 GHz Service to operators' ability to provide robust wireless service to their customers and the potential of harmonized spectrum for delivering benefits for equipment and device users.⁵² As commenters note, the 3 GHz band is "the preferred band for 5G globally,"⁵³ and there are benefits in aligning the rules for this band with those of other core 5G bands.⁵⁴ The record further reflects that by leveraging rules that apply to other U.S. spectrum bands with federal incumbents, like the AWS band or other 3 GHz spectrum, we will enable providers to pair 3.45 GHz spectrum with other spectrum through equipment harmonization and spectrum aggregation.⁵⁵ This promotes the objectives of section 309(j) to support investment, minimize harmful interference, and align with international agreements, as discussed further below.

A. Allocating the 3.45 GHz Band for Commercial Wireless Use

17. Consistent with the Beat CHINA for 5G Act of 2020,⁵⁶ we adopt our proposal to add a primary non-federal fixed and mobile, except aeronautical mobile, allocation to the 3.45 GHz band nationwide.⁵⁷ As the Commission noted in the *FNPRM*, section 303(y) provides us with authority to

⁵⁰ See *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd 11085, para. 19.

⁵¹ See *id.* at 11091, para. 38.

⁵² See, e.g., T-Mobile Comments at 29 (noting that harmonization of the band with the 3.7 GHz Service would "ensure that operations in the 3.45-3.55 GHz band are consistent with industry standards for mobile devices and adequate for robust 5G deployments"); Verizon Comments at 12 (supporting "3.7 GHz-style technical and service rules" because they will "support robust deployment of 5G services in the band" in contrast to "restrictive rules that would limit the suitability of the band for large-scale 5G deployments or otherwise negate equipment harmonization and carrier aggregation opportunities"); see also CTIA Dec. 18, 2020 *Ex Parte* Letter at 1.

⁵³ 5G Americas Comments at 2.

⁵⁴ As U.S. Cellular notes, aligning the rules for the 3.45 GHz band with those of the AWS band and the 3.7 GHz band not only will promote international harmonization, but also will create network efficiencies and foster greater use. U.S. Cellular Reply at 24.

⁵⁵ See, e.g., T-Mobile Comments at 29; Verizon Comments at 12.

⁵⁶ The Beat CHINA for 5G Act of 2020 required the Commission to "revise the non-Federal allocation for the [3.45 GHz band] to permit flexible-use services." Beat CHINA for 5G Act of 2020 § 905(d)(1)(A).

⁵⁷ At this time, however, we only make licenses available in the contiguous United States, due to lack of DoD analysis at this time of the adjustments that may be necessary to its operations outside of the contiguous United States.

allocate spectrum for flexible use if: “(1) such use is consistent with international agreements to which the United States is a party; and (2) the Commission finds, after notice and opportunity for public comment, that (A) such an allocation would be in the public interest; (B) such use would not deter investment in communications services and systems, or technology development; and (C) such use would not result in harmful interference among users.”⁵⁸

18. Our proposed non-federal allocation is consistent with and furthers these goals for several reasons. First, the allocation is consistent with international agreements.⁵⁹ Indeed, it will harmonize the Commission’s allocation for the 3.45 GHz band with international allocations.⁶⁰ As 5G Americas notes, there is now a critical mass of countries that have auctioned or otherwise made spectrum available in the 3.3-4.2 GHz range (band n77).⁶¹ Second, the proposed allocation will make more critical mid-band spectrum available for 5G and other advanced wireless services.⁶² For example, AT&T notes that adopting a primary non-federal fixed and mobile (except aeronautical mobile) allocation for the 3.45 GHz band will “serve the public interest by advancing U.S. leadership in next-generation 5G networks.”⁶³ The allocation will foster more intensive 5G use of mid-band spectrum to facilitate and incentivize investment in next-generation wireless services. Third, we expect that the allocation will promote investments in the band by flexible-use licensees.⁶⁴ Mid-band spectrum is particularly well-suited for 5G buildouts due to its desirable mix of coverage, capacity, and propagation characteristics, and we anticipate that this spectrum will attract significant investment from 5G network operators.⁶⁵ Finally, the actions we take in this Second Report and Order will promote effective coordination between new flexible-use licensees and remaining incumbent federal operations.⁶⁶ No commenter disagrees with our proposed flexible-use allocation under section 303(y). Accordingly, we adopt the Commission’s proposal to add a primary non-federal fixed and mobile, except aeronautical mobile, allocation to the 3.45 GHz band nationwide.

19. Today we allocate the 3.45 GHz band for non-federal fixed and mobile (except aeronautical mobile) operations nationwide. However, at this time, as discussed below, we will only

⁵⁸ See 47 U.S.C. § 303(y); *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11092, para. 41.

⁵⁹ The U.S. is a signatory to the United Nations International Telecommunication Union Radio Regulations treaty, which is seeing growing interest in using band n77, which includes 3.45-3.55 GHz, for mobile broadband. See 5G Americas Comments at 4. In addition, the U.S. is a member of the Organization of American States and is active in its Inter-American Telecommunications Commission (CITEL), which has recommended the use of 3.4-3.5 GHz for secondary mobile broadband and of 3.5-3.7 GHz for primary mobile broadband. *Id.* at 5.

⁶⁰ See *supra* note 6.

⁶¹ 5G Americas Comments at 2; see also CommScope Comments at 4-5 (noting that globally, the 3.4-4.2 GHz frequency range has emerged as the ‘sweet spot’ for 5G mid-band services); Verizon Comments at (i); US Cellular Reply at 3.

⁶² See 5G Americas Comments at 2; AT&T Comments at 4; CBRS Alliance Comments at 2; Charter & Cox Comments at 1; CommScope Comments at 4; CCA Comments at 2-3; CTIA Comments at 5; Dynamic Spectrum Alliance Comments at 2; Ericsson Comments at 17; Microsoft Comments at 6; Moise Advisory Comments at 1; Nokia Comments at 1; Qualcomm Comments at 2; Sony Comments at 1; Southern Linc Comments at 1; T-Mobile Comments at 1; T-Mobile Reply at 3; U.S. Territories Service Providers Comments at 2; Verizon Comments at 4; WISPA Comments at 1.

⁶³ AT&T Comments at 4; see also CTIA Reply at 1-2.

⁶⁴ See CTIA Comments at 5 (noting that making this spectrum available would create “a substantial opportunity for global harmonization, which drives robust equipment markets, speeds deployments, reduces costs for service, and enables global roaming”).

⁶⁵ See Microsoft Comments at 1 (noting that mid-band spectrum is viewed as the sweet spot for balancing coverage and capacity); Verizon Comments at (i) (noting 3.45 GHz band is a sweet spot for 5G given its optimal combination of coverage and capacity).

⁶⁶ See US431B, Appendix A.

license this band for non-federal operations in the contiguous United States because the AMBIT efforts limited their focus to the contiguous United States.⁶⁷

B. Cooperative Sharing Regime in the 3.45 GHz Band

20. The 3.45 GHz band currently is used by the DoD for high- and low-powered radar systems on a variety of platforms in the 3 GHz band, including fixed, mobile, shipborne, and airborne operations. Both NTIA and the AMBIT efforts identified the 3.45 GHz band for cooperative sharing between incumbent DoD operations and new commercial operators,⁶⁸ under which commercial providers will be able to use the band on an unrestricted basis, except under a few limited circumstances (described below). Consistent with the conclusions of our federal partners, we adopt a cooperative sharing regime for the 3.45 GHz band.

21. Under this framework, non-federal systems generally will have unencumbered, full-power use of the entire band across the contiguous United States and, with limited exceptions, federal systems operating in the band may not cause harmful interference to non-federal operations in the band. In limited circumstances and in locations where current incumbent federal systems will remain in the band, however, non-federal systems will not be entitled to protection against harmful interference from federal operations (and limited restrictions will be placed on non-federal operations).⁶⁹ These exceptions will occur only in geographic areas specifically identified as Cooperative Planning Areas and Periodic Use Areas.⁷⁰ NTIA describes these areas as “key military training facilities, important test sites, and strategically significant Navy home ports and shipyards.”⁷¹ NTIA stresses that these areas are not exclusion zones.⁷² We emphasize that commercial operations are not precluded within Cooperative Planning Areas and Periodic Use Areas. Rather, incumbent federal operations⁷³ and new flexible-use operations must coordinate with each other to facilitate shared use of the band in these specified areas and during specified time periods.⁷⁴ The coordination regime we adopt today is intended to minimize the impacts from incumbent federal operations on future commercial operations while still enabling effective federal operations where and when necessary, given the need to preserve military readiness and capabilities and support real-world operations when required.⁷⁵

⁶⁷ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11111, para. 97.

⁶⁸ See NTIA July 2020 Report; NTIA 2020 *Ex Parte* Letter at 2; Letter from Charles Cooper, Associate Administrator, NTIA, to Ronald T. Repasi, Acting Chief, OET, FCC and Joel Taubenblatt, Acting Chief, WTB, FCC, WT Docket No. 19-348, at 1 (filed Feb. 19, 2021) (NTIA 2021 *Ex Parte* Letter).

⁶⁹ Some commenters note that the DoD has sought comment on opportunities and possible mechanisms for sharing spectrum below 3.45 GHz on a commercial basis. See AIA Comments at 16 (citing *Defense Spectrum Sharing*, Notice, Request for Information, Department of Defense (Sept. 18, 2020), https://beta.sam.gov/opp/4851a65e2b2d4d73865a0e9865b0c28a/view?keywords=dod&sort=-modifiedDate&index=&is_active=true&page=1); T-Mobile Comments at 7-8. We note that in the context of this proceeding, federal operations refer to operations by federal agencies pursuant to their federal allocations and do not include leasing by federal agencies to other entities.

⁷⁰ See US431B, Appendix A. In addition, we note that, as in any other service, 3.45 GHz Service licensees will be subject to the requirements of section 706(c) of the Communications Act. 47 U.S.C. § 606(c).

⁷¹ NTIA 2021 *Ex Parte* Letter at 2 (Cooperative Planning Areas and Periodic Use Areas “are not exclusion zones, but are areas where military systems require protection from harmful interference from new non-federal operations, either indefinitely (in CPAs) or episodically (in PUAs), in support of national security missions and to meet readiness requirements.”)

⁷² *Id.* at 2.

⁷³ Incumbent operations include all current and planned federal use in the 3450-3550 MHz band.

⁷⁴ See NTIA 2020 *Ex Parte* Letter at 1-2.

⁷⁵ See *id.* at 2.

22. This coordination regime builds upon the AWS-3 framework and incorporates lessons learned from AWS-3 and other shared services, such as the Citizens Broadband Radio Service. As with those services, and with AWS-3 in particular, new flexible-use 3.45 GHz Service licensees must coordinate with DoD incumbents to facilitate shared use of the band, here within Cooperative Planning Areas and Periodic Use Areas. But beyond simply coordinating within those areas, federal and non-federal operators are encouraged to enter into mutually acceptable operator-to-operator agreements to permit more extensive flexible use within Cooperative Planning and Periodic Use Areas by agreeing to a technical approach that mitigates the interference risk to federal operations. The current parameters of Cooperative Planning and Periodic Use areas, as discussed further below, are the default, but in practice should be a starting point for negotiations between flexible-use licensees and federal incumbents; more expansive use by the flexible-use licensee can be agreed to in areas and under circumstances or parameters acceptable to the federal incumbent. We adopt this progression in coordination regimes to unleash mid-band spectrum for next-generation wireless services. Further, our approach is consistent with the AMBIT's goal of providing immediate, full power, commercial access to 100 megahertz of contiguous spectrum between 3.45-3.55 GHz, to the maximum extent possible.⁷⁶ The coordination framework we adopt today will benefit consumers as well as federal agencies and the military, as they can also take advantage of these additional commercial broadband and 5G networks and the economies of scale they create.

1. Cooperative Planning Areas and Periodic Use Areas

23. *Definitions.*—During the AMBIT efforts, the DoD identified a list of “Cooperative Planning Areas,” within which it anticipates that federal operations will continue after the assignment of flexible-use licenses in the band. These areas are limited in size and scope and include military training facilities, test sites, Navy home ports, and shipyards. We define Cooperative Planning Areas as “geographic locations in which non-federal operations shall coordinate with federal systems in the band to deploy non-federal operations in a manner that shall not cause harmful interference to federal systems operating in the band.”⁷⁷ In these areas, “operators of non-Federal stations may be required to modify their operations (e.g., reduce power, add filters adjust antenna pointing angles, install shielding, etc.) to protect Federal operations against harmful interference and to avoid, where possible, interference and potential damage to the non-Federal operators’ systems.”⁷⁸ Further, “[i]n these areas, non-Federal operations may not claim interference protection from Federal systems.”⁷⁹ However, “Federal and non-Federal operators may reach mutually acceptable operator-to-operator agreements to permit more extensive non-Federal use by identifying and mutually agreeing upon a technical approach that mitigates the interference risk to Federal operations.”⁸⁰ To the extent that high-powered federal operations will remain that may cause harmful interference to commercial operations, NTIA has recommended that federal operators should share information about these risks with the commercial operators in the context

⁷⁶ *Id.* at 1; *see also* Hon. Dana Deasy, Department of Defense Chief Information Officer, Department of Defense Statement on Mid-Band Spectrum, Aug. 10, 2020, <https://www.defense.gov/Newsroom/Speeches/Speech/Article/2307288/department-of-defense-statement-on-mid-band-spectrum/>.

⁷⁷ *See* US431B, Appendix A. Harmful interference is defined in part 2 of our rules as, “[i]nterference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with [the ITU] Radio Regulations.” 47 CFR § 2.1(c). The source of this definition is the Annex to the Constitution of the International Telecommunications Union (ITU). *Id.* § 2.1(b). We note that “[w]here a term or definition appears in this part of the Commission's Rules, it shall be the definitive term or definition and shall prevail throughout the Commission's Rules.” *Id.* § 2.1(a).

⁷⁸ *See* US431B, Appendix A.

⁷⁹ *See id.*

⁸⁰ *See id.*

of coordination agreements.⁸¹ NTIA states that, “[t]o the extent possible, Federal use in Cooperative Planning Areas will be chosen to minimize operational impact on non-Federal users.”⁸²

24. In response to numerous commenters’ requests for additional clarity regarding Cooperative Planning Areas,⁸³ we include in part 2 of the Commission’s rules the more detailed list of parameters for such areas that NTIA has provided.⁸⁴ For each Cooperative Planning Area, we provide either a point and radius or a series of geographic coordinates (which create a polygon) to define the boundary of the area. Using this information, potential bidders will be able to determine precisely which areas will require coordination with the DoD. NTIA states that the DoD will create a workbook, similar to the one that it created in the AWS-3 transition, to provide potential bidders with additional information about these areas before bidding commences in the Commission’s auction.⁸⁵

25. In addition, the DoD has identified several “Periodic Use Areas” that overlap with certain Cooperative Planning Areas. In these Periodic Use Areas, the DoD will need episodic access to all or a portion of the band in specific, limited geographic areas,⁸⁶ in which it will coordinate with affected licensees for specific times and bandwidths.⁸⁷ Accordingly, we define Periodic Use Areas as “geographic locations in which non-Federal operations in the band shall not cause harmful interference to Federal systems operating in the band for episodic periods.”⁸⁸ Moreover, “during these times and in these areas, Federal users will require interference protection from non-Federal operations.”⁸⁹ As with Cooperative Planning Areas, within Periodic Use Area, “[o]perators of non-Federal stations may be required to temporarily modify their operations (e.g., reduce power, filtering, adjust antenna pointing angles, shielding, etc.) to protect Federal operations from harmful interference, which may include restrictions on non-Federal stations’ ability to radiate at certain locations during specific periods of time.”⁹⁰ During such episodic use, “non-Federal users in Periodic Use Areas must alter their operations to avoid harmful interference to Federal systems’ temporary use of the band, and during such times, non-Federal operations may not claim interference protection from Federal systems.”⁹¹ However, “Federal and non-Federal operators may reach mutually acceptable operator-to-operator agreements such that a Federal operator may not need to activate a Periodic Use Area if a mutually agreeable technical approach mitigates the

⁸¹ NTIA 2021 *Ex Parte* Letter at 4; *see also* US431B, Appendix A.

⁸² NTIA 2020 *Ex Parte* Letter at Enclosure 1; *see also* US431B, Appendix A.

⁸³ *See* 5G Americas Reply at 5; AT&T Comments at 7-9; CommScope Comments at 6-7; CTIA Comments at 9; CTIA Reply at 3, 14; Ericsson Comments at 8; Google Comments at 6; T-Mobile Reply at 17.

⁸⁴ *See* NTIA 2021 *Ex Parte* Letter at Enclosure 1; 47 CFR part 2, Appendix A.

⁸⁵ NTIA 2021 *Ex Parte* Letter at 4; *see also* *Wireless Telecommunications Bureau Informs Potential Auction 97 Applicants of Updated Department of Defense Workbook Posted to NTIA’s Website*, Public Notice, 29 FCC Rcd 10602 (WTB 2014); *Wireless Telecommunications Bureau Informs Potential Auction 97 Bidders of Department of Defense Data on Experimental Operations Posted to NTIA’s Website*, Public Notice, 29 FCC Rcd 11656 (WTB 2014).

⁸⁶ NTIA 2020 *Ex Parte* Letter at Enclosure 3. Such uses are typically known well in advance and involve use of the spectrum for variable periods of duration, e.g., equipment testing, periodic exercises. Short notice requirements could occur and would need to be coordinated with licensees.

⁸⁷ “To the extent possible, federal use in Periodic Use Areas will be chosen to minimize operational impact to non-federal users.” NTIA 2020 *Ex Parte* Letter at Enclosure 1.

⁸⁸ *See* US431B, Appendix A; *see also* 47 CFR § 2.1 (definition of harmful interference).

⁸⁹ *See* US431B, Appendix A.

⁹⁰ *See id.*

⁹¹ *See id.*

interference risk to Federal operations.”⁹² NTIA notes that, “[t]o the extent possible, Federal use in Periodic Use Areas will be chosen to minimize operational impact on non-Federal users.”⁹³ We note that “[r]estrictions and authorizations for the Cooperative Planning Areas remain in effect during periodic use unless specifically relieved in the coordination process.”⁹⁴

26. In response to commenters’ requests,⁹⁵ we include a list of Periodic Use Areas in part 2 of the Commission’s rules.⁹⁶ As with Cooperative Planning Areas, we provide either a point and radius or a series of coordinates (which create a polygon) to define the boundaries of the area within which future licensees must coordinate with the DoD. In both Cooperative Planning and Periodic Use Areas, the coordination procedures we adopt in this Second Report and Order will ensure maximum possible use of flexible-use licenses while allowing the DoD to continue to operate in these areas with protection against harmful interference adequate to preserve military readiness, capabilities, and national security.

27. *Parameters.*—NTIA and the DoD identified 33 Cooperative Planning Areas, 23 of which overlap with Periodic Use Areas.⁹⁷ In defining each area, the DoD’s analysis employed certain assumptions and parameters, including: (1) 5G networks operating at a maximum power of 1640 watts/MHz in urban environments and 3280 watts/MHz in non-urban environments; (2) an EMI threshold of -35dBm/m² peak power density from the nearby radar; and (3) damage to 5G networks calculated at a threshold of +35dBm/m² peak power density from the nearby radar.⁹⁸ In the event that the DoD modifies its use in any existing Cooperative Planning or Periodic Use Area so as to *decrease* the size of such area, we delegate authority to the Wireless Telecommunications Bureau and the Office of Engineering and Technology, in coordination with NTIA, to reflect such smaller areas in our rules. In this regard, we note that the existing Cooperative Planning and Periodic Use Areas identified by the rules adopted in this Second Report and Order cannot be increased in size, and no Cooperative Planning Area or Periodic Use Area not so identified can be added in the contiguous United States.

28. In general, 3.45 GHz Service licensees will be able to operate within each Cooperative Planning Area, but may need to plan their network layout, choose power levels and antennas, and install filters and shielding, to maximize flexible use of the band, consistent with operator-to-operator agreements they enter into with DoD operators. In certain locations, the DoD operates high-powered radars.⁹⁹ Flexible-use licensees must accept interference from these high-powered DoD radars within the Cooperative Planning and Periodic Use Areas, “unless the operators are able to reach an agreement that provides additional assurances or protections to each operator.”¹⁰⁰ NTIA recommends that “to the extent that higher power DoD radars located at the CPAs labeled in [part 2, Appendix A of the Commission’s rules] may cause harmful interference to commercial operations within these zones, . . . DoD and licensees [should] include in coordination agreements language that acknowledges the risks of harmful interference inside of these zones (along the lines set forth in the AWS-3 coordination agreement

⁹² *See id.*

⁹³ NTIA 2020 *Ex Parte* Letter at Enclosure 1; *see also* US431B, Appendix A.

⁹⁴ *See* US431B, Appendix A.

⁹⁵ *See* AT&T Comments at 7-9; CommScope Comments at 6-7; CTIA Comments at 9; Ericsson Comments at 8; Google Comments at 6.

⁹⁶ *See* 47 CFR pt. 2, Appendix A.

⁹⁷ *See* US431B, Appendix A.

⁹⁸ *See* NTIA 2020 *Ex Parte* Letter, Enclosure 5.

⁹⁹ High-powered radars are denoted in the table in footnote US431B of section 2.106 of our rules. *See* US431B, Appendix A.

¹⁰⁰ NTIA 2021 *Ex Parte* Letter at 4.

template).¹⁰¹ In other areas where the DoD operates low-power radars, we expect that the DoD will coordinate with flexible-use licensees for an agreeable path forward. An operator-to-operator agreement could include network deployment plans that minimize impacts on DoD operations, while enabling the widest flexible-use deployments possible. We note that, unless the entire 3.45 GHz Service licensed area falls within a Cooperative Planning Area or Periodic Use Area, cooperative sharing will only take place in those portions of a licensee's geographic licensed area that fall within the defined boundaries of a Cooperative Planning Area or Periodic Use Area, and not across the entire licensed area.¹⁰² In other words, outside of the defined boundaries of the Cooperative Planning Area or Periodic Use area, the 3.45 GHz Service licensee will have unencumbered use of the band.

29. We reiterate that the Cooperative Planning and Periodic Use Areas are not exclusion zones, because licensees will be permitted to operate in these areas subject to the coordination requirements, and these zones were developed based on the Commission's proposed power limits and assuming relatively high antenna heights.¹⁰³ In practice, we expect that the areas in which flexible-use licensees may need to adjust their networks will be smaller than the areas encompassed by the Cooperative Planning and Periodic Use Area boundaries we are adopting. First, actual flexible-use operations are likely to use lower towers and lower power than the maximum tower heights and power levels permitted under our rules, which NTIA and the DoD used in their analyses to generate the Cooperative Planning Areas and Periodic Use Areas. NTIA expects that this "should result in greater industry access to the spectrum in and around the CPAs and PUAs."¹⁰⁴ Second, non-federal licensees can coordinate with federal users and enter into operator-to-operator agreements "so that new commercial operations would not interfere with protected incumbent federal systems, or so that any risk of harmful interference to non-federal operations is mitigated so long as the non-federal users are operating pursuant to the agreement."¹⁰⁵ For example, as NTIA notes, the "DoD could agree to not activate a PUA if a mutually agreeable technical interference mitigation approach is identified."¹⁰⁶ Absent an operator-to-operator agreement permitting more extensive use within a Cooperative Planning or Periodic Use Area, a 3.45 GHz Service licensee must protect federal incumbents against harmful interference within the area parameters denoted in the table in footnote US431B of section 2.106 of our rules.

30. *Fort Bragg and Little Rock.*—In all but two of the Cooperative Planning and Periodic Use Areas, 3.45 GHz Service licensees must coordinate with the DoD across all 100 megahertz of the spectrum within the areas. In the Fort Bragg, North Carolina, Cooperative Planning Area and Periodic Use Area, in contrast, licensees will only need to coordinate in the lower 40 megahertz of the band, i.e., between 3450-3490 MHz. NTIA indicates that the DoD will only use the lower 40 megahertz of the band in this area, leaving the upper 60 megahertz unencumbered and available for full-power, flexible-use operations in accordance with the rules adopted herein.¹⁰⁷ Thus, licensees in the upper portion of the band, i.e., between 3490-3550 MHz, need not coordinate with the DoD in these areas.¹⁰⁸

¹⁰¹ *Id.* (citing Coordination Procedures in the 1695-1710 MHz and 1755-1780 MHz Bands); FCC/NTIA Joint Public Notice, GN Docket No. 13-185, 29 FCC Rcd 8527, 8567 Appendix C-3 (FCC/NTIA Jul. 18, 2014); *see also* 79 Fed. Reg. 54710 (Sept. 12, 2014).

¹⁰² *See* 5G Americas Comments at 11-12.

¹⁰³ *See* NTIA 2021 *Ex Parte* Letter at 2, 3.

¹⁰⁴ *See id.* at 3.

¹⁰⁵ *See id.* at 4.

¹⁰⁶ *Id.* at 4.

¹⁰⁷ *Id.* at 2-3, n.6, Enclosure.

¹⁰⁸ *Id.*

31. In the Little Rock, Arkansas Cooperative Planning Area, for approximately the first 12 months following the close of the auction for this band, licensees will have to coordinate with the DoD across all 100 megahertz of the spectrum within those areas.¹⁰⁹ After this time period, however, licensees will only need to coordinate in the lower 40 megahertz of the band, as the DoD states that it will vacate the upper 60 megahertz, i.e., between 3490-3550 MHz, by that time.¹¹⁰

32. *Federally Authorized Contractor Test Facilities.*—Consistent with the *FNPRM* and with NTIA authorizations, Federally Authorized Contractor Test (FACT) facilities that operate within a Cooperative Planning Area or Periodic Use Area pursuant to a NTIA authorization will be treated the same as other federal facilities within such areas.¹¹¹ NTIA authorizes radio stations belonging to and operated by the United States.¹¹² To the extent that NTIA has authorized such stations to operate within a FACT, those operations should be entitled to the same protections as other federal operations within Cooperative Planning Areas or Periodic Use Areas, consistent with their NTIA authorizations.¹¹³

33. In this context, we note that the Aerospace Industries Association asks us to refine our coordination requirements to include protection for future non-federal experimental operations at facilities located within Cooperative Planning Areas, as well as experimental operations at the small number of non-federal facilities that are located outside of Cooperative Planning Areas.¹¹⁴ The Aerospace Industries Association also asks that we impose coordination obligations for non-federal test facilities wholly located within Cooperative Planning Areas.¹¹⁵ Further, the Aerospace Industries Association asks that a

¹⁰⁹ *Id.*

¹¹⁰ *Id.*

¹¹¹ See *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11094, para. 46 n. 94. We note that in the *FNPRM*, the Commission only discussed requiring coordination of FACT facilities located within Cooperative Planning Areas. We conclude that for purposes of such coordination, FACT facilities located within Periodic Use Areas warrant comparable treatment, particularly when all Periodic Use Areas are co-located with Cooperative Planning Areas.

¹¹² See 47 U.S.C. §§ 305(a), 902(b)(2)(A). Moreover, contractors operating under an agency's NTIA authorization work under the supervision and effective control of a U.S. government entity to facilitate U.S. government activities; these commercial entities are not leasing federal spectrum to use for their own purposes. See NTIA, Manual of Regulations and Procedures for Federal Radio Frequency Management, §§ 8.2.17, 9.1.4.

¹¹³ See Letter from Kara Graves, Assistant Vice President, Regulatory Affairs, CTIA, to Marlene H. Dortch, Secretary, FCC, WT Docket 19-348 at 3 (Mar. 9, 2021) (CTIA Mar. 9, 2021 *Ex Parte* Letter) (asking for clarification that FACT site coordination with Cooperative Planning and Periodic Use Areas should align with and should not impose additional burdens on 3.45 GHz Service licensees beyond operator-to-operator coordination plans).

¹¹⁴ Aerospace Industries Association Comments at 12-13; Aerospace Industries Association Reply at 1; see also Lockheed Martin Comments at 13 (advocating for protection of non-federal facilities located near Cooperative Planning Areas); Lockheed Martin Reply at 9; 5G Americas Reply at 4 (asking that inclusion of non-federal facilities be clarified). See also T-Mobile Reply at 19 (opposing extension of coordination requirement for FACT facilities outside of Cooperative Planning Areas); AT&T Reply at 14.

¹¹⁵ See Letter from Karina Perez Molina, Manager, Unmanned and Emerging Aviation Technologies, Aerospace Industries Association, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 at Attachment (filed Mar. 9, 2021) (AIA Mar. 9, 2021 *Ex Parte* Letter); see also Letter from Michele Farquhar, Counsel to Lockheed Martin Corporation, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 at 2 (filed Mar. 5, 2021) (asking that the Commission “deem” Lockheed Martin’s Moorestown testing facility “coordinated by default” because it is completely encompassed with the contours of a Cooperative Planning Area). Lockheed Martin argues that Commission precedent supports requiring coordination requirements for a small set of incumbent experimental licensees in the band. To this end, Lockheed Martin identified several instances in which the Commission elevated secondary operations to primary status in order to protect valuable incumbent services while reallocating the band for other services. Letter from Michele Farquhar, Counsel to Lockheed Martin Corporation, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 at 3-4 (filed Mar. 11, 2021). We find the cited precedent distinguishable

(continued....)

coordination process be created either by the National Defense Industrial Association Spectrum Working Group or the Commission to coordinate operations at testing facilities not wholly located within Cooperative Planning Areas.¹¹⁶ NTIA notes that several radar manufacturing and integration facilities require access to the 3.45 GHz band to perform experimentation and testing for radionavigation and other systems contracted for by federal agencies.¹¹⁷ According to NTIA, these facilities typically operate outdoors to accommodate physically large operational systems and NTIA states that these facilities must retain access to the spectrum for testing and experimentation to ensure that agencies' contracting requirements can be fulfilled.¹¹⁸ NTIA requests that the Commission continue to work with NTIA, the DoD, and other concerned stakeholders to develop a coordination framework to ensure that these non-federal experimental licensees in the 3.45 GHz band are able to continue to access spectrum to support their critical functions in support of the DoD, in a way that minimizes potential impacts to the 3.45 GHz Service.¹¹⁹

34. We recognize that the DoD has expended significant time and resources to craft limited Cooperative Planning Areas or Periodic Use Areas that maximize new commercial operations while still allowing effective mission-critical DoD uses. While the DoD's calculations and assessments do not consider future operations by non-federal radiolocation experimental licensees within or outside these areas, we agree that these contractor facilities have needs to access the spectrum for testing and experimentation as the Commission has recognized in authorizing various part 5 experimental authorizations. Protection of such operations by rule is outside the scope of the AMBIT efforts. Further, expanding protection to future non-federal operations at FACT facilities would create uncertainty for potential bidders considering commercial deployments in the band. We note, however, that non-federal entities will continue to be able to obtain experimental licenses for such testing under our part 5 rules, which limit experimental use to operations on a non-interference basis and generally require licensees to notify or coordinate with incumbent spectrum users to avoid causing harmful interference.¹²⁰ Accordingly, we do not extend coordination obligations on commercial licensees for existing or future non-federal radiolocation operations authorized under part 5 of the rules regardless of whether they are located either inside or outside of Cooperative Planning Areas or Periodic Use Areas.¹²¹ We expect all future commercial licensees to cooperate with part 5 licensees when presented with requests for experimentation and testing in the 3.45 GHz band to enable continued development and upgrades of essential DoD systems.¹²² Moreover, we encourage all stakeholders to work with the National Defense

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because none of the instances cited involved elevating experimental licenses, which operate solely on a non-interference basis.

¹¹⁶ See AIA Mar. 9, 2021 *Ex Parte* Letter at Attach. (proposing that if the National Defense Industrial Association Spectrum Working Group does not present the Commission with a coordination approach 180 days prior to the scheduled start of the auction in the band, that the Commission will take steps to develop a coordination framework).

¹¹⁷ NTIA 2021 *Ex Parte* Letter at 6.

¹¹⁸ *Id.*

¹¹⁹ *Id.*

¹²⁰ See 47 CFR § 15.5 "General conditions of operation" for experimental licenses.

¹²¹ See T-Mobile Reply at 19 (opposing extension of coordination requirement for FACT facilities outside of Cooperative Planning Areas); AT&T Reply at 14; Letter from Kara Graves, Assistant Vice President, Regulator Affairs, CTIA, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348, at 2 (filed Mar. 10, 2021) (CTIA Mar. 10, 2021 *Ex Parte* Letter).

¹²² See Letter from Steve B. Sharkey, Vice President, Government Affairs, T-Mobile, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348, at 5 (filed Mar. 5, 2021) (T-Mobile Mar. 3, 2021 *Ex Parte* Letter) (noting that "T-Mobile is generally open to working cooperatively with entities to accommodate reasonable needs" but

(continued....)

Industrial Association Spectrum Working Group to develop mutually agreeable practices regarding experimental use of the band for defense radar testing and development.¹²³ The Commission will monitor the results of this approach, and may revisit it as necessary based on the experience of experimental and 3.45 GHz Service licensees. To that end, we encourage parties to provide the Commission with information on this approach if needed.

2. National Emergencies

35. In light of NTIA's February 2021 letter stating that no specific provision in US431B is needed for federal use during time of national emergency,¹²⁴ we do not adopt such a provision. We agree with NTIA that section 706(c) of the Communications Act and other relevant authorities provide sufficient ability for the DoD to access the band in the extraordinary circumstances under which a national emergency might necessitate access to the 3.45 GHz band. Accordingly, we need not modify the existing regulatory framework that applies generally to all bands in this regard.

36. In the *FNPRM*, the Commission, noting that the DoD may require access to the band during times of national emergency to fulfill military operational needs,¹²⁵ proposed that federal users should be authorized to operate within the band pursuant to existing radiolocation authorizations as required to meet operational mission requirements during national emergencies.¹²⁶ Numerous commenters ask that we clearly delineate the boundaries of this use and any related coordination procedures.¹²⁷ Ericsson, for example, maintains that the coordination framework should "identify what would qualify as a national emergency, the entities that have authority to declare national emergencies, and the requirements of commercial licensees (including the scope of frequencies that commercial operators must surrender during a national emergency)."¹²⁸ AT&T adds that the process must include timely communication of relevant information to licensees.¹²⁹ And some commenters question whether a separate requirement authorizing DoD use during such times is necessary in light of section 706(c) of the Communications Act.¹³⁰

37. In response to these comments and upon further review of this issue, NTIA and the DoD now agree that a specific national emergency provision in footnote US431B is not necessary.¹³¹ We agree

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"experimental operations should not completely upend the existing regulatory structure and diminish use of the band for commercial services").

¹²³ See AIA Comments at 5 (noting that radar manufacturers, 5G carriers and 5G OEMs are participating in the National Defense Industrial Association Spectrum Working Group to "explore the potential for [a] consensus approach on the use of the band by priority flexible use licensees and aerospace and defense industry contractors for testing and other experimental operations); AIA Reply at 3; Letter from Karina Perez Molina, Manager, Unmanned and Emerging Aviation Technologies, AIA, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348, at 2-3 (filed Feb. 18, 2021). As the Working Group's deliberations are ongoing, we see no need at this time to impose a deadline as requested by AIA.

¹²⁴ NTIA 2021 *Ex Parte* Letter at 5.

¹²⁵ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11097, para. 53, US431B, Appendix D; NTIA 2020 *Ex Parte* Letter at 2 n.4, Enclosure 1.

¹²⁶ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11097, para. 53; NTIA 2020 *Ex Parte* Letter at 2.

¹²⁷ See, e.g., 5G Americas Comments at 14; AT&T Comments at 9; CTIA Comments at 11-12; Ericsson Comments at 10; T-Mobile Comments at 3; Verizon Comments at 8-9.

¹²⁸ Ericsson Comments at 10.

¹²⁹ AT&T Comments at 9; see 47 U.S.C. § 606(c).

¹³⁰ T-Mobile Comments at 16; see also AT&T Comments at 9-10; CTIA Comments at 12.

¹³¹ See NTIA 2021 *Ex Parte* Letter at 5.

with this assessment. Instead of imposing a specific provision for national emergencies, in the extremely rare circumstances under which such operational needs may arise, NTIA states that such operational needs can be accommodated in the 3.45 GHz band (as well as other bands) under and consistent with section 706(c) of the Communications Act and other relevant authorities.¹³² Under section 706(c), a national emergency would be triggered by a “proclamation by the President that there exists a war or threat of war or a state of public peril or disaster or other national emergency.”¹³³ While similar language was proposed by NTIA for footnote US431B to the Table of Allocations, NTIA now states that this band-specific provision in an allocation footnote is not required in light of existing statutory authorities.¹³⁴

38. We agree with commenters and NTIA that a band-specific national emergency provision in US431B is not required and accordingly, we will not adopt the Commission’s proposal in this regard. We remind future 3.45 GHz Service licensees, however, that pursuant to section 309(h) of the Communications Act, every FCC license “shall be subject in terms to the right to use or control conferred by section 706 of this Act.”¹³⁵ Similarly, nothing under the Commission’s auction authority or in the use of competitive bidding shall limit or otherwise affect the requirements of section 309(h), section 706, or any other relevant provisions of the Communications Act.¹³⁶ Although NTIA recognizes prospective bidders’ need for adequate information to assess risks and prepare business plans for the band, it acknowledges that it would be difficult to provide “absolute certainty and predictability regarding the situations under which section 706 (or other authorities) might be invoked.”¹³⁷ Nonetheless, NTIA notes that additional information may be provided through upcoming workshops or other appropriate venues.¹³⁸

3. Coordination Procedures

39. Before a commercial licensee commences operations in a Cooperative Planning Area or Periodic Use Area, it must first successfully coordinate with the federal incumbent. The purpose of coordination is to facilitate shared use of the band in these specified areas and during specified time periods. The coordination procedures outlined here will apply to all 3.45 GHz Service licensees seeking to operate in a Cooperative Planning Area or Periodic Use Area, unless the 3.45 GHz Service licensee and the DoD have reached a mutually agreeable coordination arrangement that provides otherwise. Such arrangements could, for example, document specific notification and activation procedures.¹³⁹ While we provide a general description of these procedures here, additional coordination requirements, procedures, and scenarios may be developed, consistent with any Administrative Procedure Act or other legal requirement that may apply, in future public notices, specific operator-to-operator agreements, or other mechanisms.

40. We expect 3.45 GHz Service licensees and federal incumbents to negotiate in good faith throughout the coordination process (e.g., sharing information about their respective systems and communicating results to facilitate commercial use of the band). This approach resulted in successful

¹³² *See id.*

¹³³ 47 U.S.C. § 606(c). The President, if deemed necessary in the interest of national security or defense, may suspend or amend, for such time as the President may see fit, the rules and regulations applicable to any or all stations or devices capable of emitting electromagnetic radiations within the jurisdiction of the United States as prescribed by the Commission. No President has invoked this provision since 1951. *See* Executive Order No. 10312, 16 Fed. Reg. 12452 (Dec. 12, 1951).

¹³⁴ *See* NTIA 2021 *Ex Parte* Letter at 5.

¹³⁵ *See* 47 U.S.C. § 309(h).

¹³⁶ *Id.* § 309(j)(6)(A); *see also* 47 CFR pt. 214.

¹³⁷ NTIA 2021 *Ex Parte* Letter at 5-6.

¹³⁸ *Id.* at 6; *see also* Verizon Comments at 8-9.

¹³⁹ *See* NTIA 2021 *Ex Parte* Letter at 4.

coordination and positive experiences for federal and non-federal operators in the AWS-3 band, and we believe that it will yield the same results in this band.¹⁴⁰

41. *Contact.*—The DoD will create an online portal through which a 3.45 GHz Service licensee must initiate formal coordination requests for its relevant systems within associated Cooperative Planning Areas and/or Periodic Use Areas.¹⁴¹ In addition, according to NTIA, an Incumbent Informing Capability (IIC) also could be developed to facilitate coordination within the Periodic Use Areas.¹⁴² The DoD would use the IIC to schedule the time and frequency span for each episodic use.¹⁴³

42. *Informal Discussions.*—Before a 3.45 GHz Service licensee submits a formal coordination request, it may share draft proposals or request that federal incumbent coordination staff discuss draft coordination proposals. These discussions are voluntary, informal, and non-binding and can begin at any time. 3.45 GHz Service licensees may discuss their proposed deployments and seek guidance on appropriate measures to ensure that electromagnetic compatibility (EMC) analyses produce positive results. 3.45 GHz Service licensees and federal representatives also may develop an analysis methodology that reflects the characteristics of licensees' proposed deployments and the federal incumbents' operation. These discussions also can involve developing a process for identification and resolution of interference.

43. Informal discussions are intended to allow the federal incumbent and 3.45 GHz Service licensee to share information about their respective system designs and to identify potential issues before a formal coordination request is submitted through the DoD online portal. The federal incumbents involved, unless they specify otherwise in writing, would not be committing to any final determination regarding the outcome of the formal coordination. We strongly encourage parties to use informal, non-binding discussions to minimize or resolve basic methodological issues upfront, before having the 3.45 GHz Service licensees submit formal coordination requests. Federal incumbents' transition plans will identify a point of contact that a licensee may contact to initiate informal discussions.

44. *Formal Coordination.*—Coordination shall be initiated by the 3.45 GHz Service licensee by formally requesting access to operate within a Cooperative Planning Area and/or Periodic Use Area. This request should be made directly through the DoD online portal. The 3.45 GHz Service licensee must set up its portal account and, once established, the 3.45 GHz Service licensee will receive a user guide and training on the use of the portal and, if applicable, the IIC.

45. *Initiation, Timing, and Affirmative Concurrence.*—Unless otherwise agreed between a 3.45 GHz Service licensee and the relevant federal incumbent, no formal coordination requests may be submitted until nine (9) months after the date of the auction closing Public Notice. 3.45 GHz Service licensees may request informal discussions during this nine-month time period, however, using the point of contact identified in the applicable Transition Plan.

46. After the first nine (9) months following the close of the auction, we expect that NTIA will require federal incumbents to review and respond to formal coordination requests made through the portal in a timely manner. We encourage licensees and incumbents, through informal discussions, to

¹⁴⁰ CTIA Mar. 9, 2021 *Ex Parte* Letter at 2 (describing this as “an effective coordination regime modeled after the AWS-3 framework”).

¹⁴¹ The portal should enable the 3.45 GHz Service licensee to set up a portal account for engaging in this coordination process.

¹⁴² NTIA 2021 *Ex Parte* Letter at 3 (citing Charles Cooper, Assoc. Admin., Off. of Spect. Mgt., *NTIA Pursues Innovative Spectrum Sharing Plan That Could Deliver Boost to 5G*, (Dec. 15, 2020), <https://www.ntia.gov/blog/2020/ntia-pursues-innovative-spectrum-sharing-plan-could-deliver-boost-5g>).

¹⁴³ Several commenters support using an IIC as part of the coordination process. See, e.g., 5G Americas Comments at 14; CommScope Comments at 12; Federated Wireless Comments at 11; Google Comments at 11; Nokia Comments at 6; Sony Electronics Inc. Comments at 23; WISPA Comments at 23.

prioritize formal coordination requests as appropriate to avoid an overwhelming influx of coordination requests at the conclusion of the nine (9) month quiet period. This will help maximize the quick and efficient review of coordination requests.

47. Unless otherwise agreed to in writing, the requirement to reach a coordination arrangement is satisfied only by obtaining the affirmative concurrence of the relevant federal incumbent(s) via the portal. This requirement is not satisfied by omission. We expect that contact information and further details on federal notification and coordination requirements will be included in a future public notice jointly issued by the Commission and NTIA.¹⁴⁴

48. *Submission Information.*—To submit a formal coordination request, the 3.45 GHz Service licensee must include information about the technical characteristics for its base stations and associated mobile units relevant to operation within the Cooperative Planning Area and/or Periodic Use Area. This information should be provided in accordance with the instructions provided in the DoD's online portal user's guide. We expect that the data fields in the portal will include basic technical operating parameters (e.g., system technology, mobile EIRP, frequency block, channel bandwidth, site name, latitude, and longitude). We also anticipate that the portal will accept attachments that include narratives that explain area-wide deployments.

49. 3.45 GHz Service licensees must prioritize their deployments in the Cooperative Planning Area and/or Periodic Use Area for each federal incumbent when submitting a formal coordination request. If a licensee is seeking to coordinate with multiple systems or multiple locations of operation controlled by one federal incumbent, it must specify the order in which it prefers the federal incumbent process the request (i.e., the order of systems or geographic locations).

50. *Coordination Analysis.*—If a 3.45 GHz Service licensee has questions about the result of a coordination request, it may contact the federal incumbent to propose network design modifications to help address EMC issues raised by the federal incumbent. The federal incumbent, where feasible, may review revised technical proposals from the 3.45 GHz Service licensee. Once the 3.45 GHz Service licensee has revised its network design, it must resubmit a formal coordination request, and the 3.45 GHz Service formal coordination process begins again.

51. We stress again the benefits of informal discussions among 3.45 GHz Service licensees and federal incumbents, including during the formal coordination process. While in many cases, federal incumbent staff may be unable to provide specific information about the protected federal operations¹⁴⁵ and are not responsible for designing the 3.45 GHz Service system, they may offer some suggestions on how to address or mitigate the issue, given the limited information that can be made available on some federal systems.

52. *Dispute Resolution.*—If disputes arise during the coordination process, we strongly encourage parties to negotiate in good faith to resolve them. If a 3.45 GHz Service licensee believes that a federal incumbent is not negotiating in good faith, the licensee may seek the assistance of NTIA or it can inform the Commission. If a federal incumbent believes that a 3.45 GHz Service licensee is not negotiating in good faith, it could nonetheless timely respond to a formal request and would have the option to seek assistance from NTIA and/or the Commission. We encourage parties to enter into operator-to-operator agreements that have dispute resolution provisions for any or all possible disputes. If a dispute arises between an incumbent federal entity and a 3.45 GHz Service licensee over an operator-to-

¹⁴⁴ See NTIA 2021 *Ex Parte* Letter at 4.

¹⁴⁵ The Freedom of Information Act exempts disclosure to the public of detailed characteristics of military systems, where specifically authorized by Executive Order to be kept secret in the interest of national defense or foreign policy. 5 U.S.C. § 552(b)(1). The characterization of the interference interactions of systems that conflict with an 3.45-3.55 GHz Service licensee's desired deployment plan could run the risk of disclosing information, either directly or by inference, that has been classified and subject to substantial restrictions on access under Executive Orders and applicable regulations. See, e.g., Executive Order 13526 at part 4, 75 Fed. Reg. 707 (2009).

operator agreement, provisions calling for informal negotiation, mediation, or non-binding arbitration efforts between the parties will help to clearly define and narrow the issues for formal agency resolution by NTIA, the Commission, or both agencies acting jointly, as applicable.

53. *Sharing of Sensitive and Classified Information.*—In the *FNPRM*, the Commission sought comment on whether to adopt a process for sharing sensitive and classified information between federal and commercial stakeholders and whether to base such procedures on the ones previously used for AWS-3.¹⁴⁶ Commenters generally support such a process.¹⁴⁷ Wireless carriers advocate for a “Trusted Agent” process in which industry members with the requisite clearance (e.g., Public Trust, Secret, Top Secret, etc.), may gain access to discrete classified information in advance of any auction of licenses in the band.¹⁴⁸ Verizon maintains that such a process “would allow for closer cooperation between the DoD and industry stakeholders and lead to more efficient use of this valuable spectrum band.”¹⁴⁹ Given the classified and sensitive nature of some of the information to be shared by the DoD for effective coordination in the band, we expect that NTIA and the DoD will develop procedures, methods, and means for sharing such information (e.g., through the “Trusted Agent” process).¹⁵⁰

54. *Notification Procedures for Periodic Use Areas.*—We anticipate that NTIA will establish notification procedures to govern the DoD’s required episodic access to the 3.45 GHz band in Periodic Use Areas. Specifically, we expect that the 3.45 GHz Service licensee(s) and the federal incumbent will establish operator-to-operator agreements that detail notification processes and timelines prior to the initiation of commercial operations within the Periodic Use Area. The operator-to-operator agreement could, for example, specify the notification process, content, and timelines (i.e., the starting and ending dates and times of such use). The agreements also may specify that the 3.45 GHz Service licensee(s) and the federal incumbent may use a scheduling tool to complete the notification process or agree to technical limitations to commercial operations (e.g., reduced power levels and antenna pointing angles in lieu of a notification process).¹⁵¹ We believe that this approach will provide maximum flexibility for the 3.45 GHz Service licensee and the federal incumbent to develop tailored solutions. We also find that this process is consistent with Verizon’s request that licensees be given as much advance notice as possible before the DoD begins operations.¹⁵²

55. *Interference Resolution Process.*—The introduction of non-federal, flexible-use licenses increases the possibility that interference will occur between the new entrants and incumbent federal users. As reflected in the new footnote US431B to the Table of Allocations, flexible-use licensees in both types of coordination areas (Cooperative Planning Areas and Periodic Use Areas) must not cause harmful interference to federal users, and federal users should minimize the operational impact on non-federal users.¹⁵³ Furthermore, 3.45 GHz Service licensees cannot claim interference protection within the

¹⁴⁶ 3.1-3.55 GHz R&O and *FNPRM*, 35 FCC Rcd at 11094-95, para. 46. See also CTIA Sept. 17 *Ex Parte* Letter at 2 (stressing the need for the sharing of technical details between federal operators and licensees).

¹⁴⁷ See 5G Americas Comments at 12; AT&T Comments at 8; CTIA Comments at 11; Verizon Comments at 6. Alternatively, Federated Wireless and CommScope advocate for a frequency coordinator to receive and safeguard controlled unclassified information and classified data. CommScope Comments at 10; Federated Wireless Comments at 7-8. We find a third-party frequency coordinator in the band unnecessary because commercial licensees and federal incumbents can coordinate directly and therefore decline to adopt Federated Wireless’s and CommScope’s proposals.

¹⁴⁸ See AT&T Comments at 8; CTIA Comments at 11; Verizon Comments at 6.

¹⁴⁹ Verizon Comments at 6-7.

¹⁵⁰ See NTIA 2021 *Ex Parte* Letter at 4.

¹⁵¹ *Id.* at 3-4.

¹⁵² Verizon Comments at 8.

¹⁵³ See US431B, Appendix A.

coordination areas, absent an operator-to-operator agreement that specifies otherwise. In instances of identified harmful interference occurring between a federal and non-federal operator not addressed by the coordination procedures or operator agreements, the 3.45 GHz Service licensee shall first attempt to resolve the interference directly. If that effort is unsuccessful, the 3.45 GHz Service licensee, if adversely affected, may escalate the matter to the Commission.

56. *Future Workshops and Workbooks.*—Commenters widely support the use of workshops to collaborate and coordinate between industry stakeholders and the DoD.¹⁵⁴ NTIA states that it will work with the DoD will make additional information available via a variety of means, including the posting of approved transition plans and a workbook similar to the DoD’s AWS-3 Workbook, as well as through “upcoming workshops.”¹⁵⁵ According to NTIA, such supplemental information will likely include updates on the coordination portal and IIC developments and procedures, as well as guidance on anticipated received power levels from the DoD’s high-powered operations, methods and means for sharing proprietary and classified information (e.g., through “Trusted Agents”), and descriptions of potential national emergency scenarios.¹⁵⁶

57. Federal use of the radio spectrum is generally governed by NTIA while non-federal use is governed by the Commission.¹⁵⁷ Accordingly, NTIA and the Commission may decide that jointly issued further guidance or details concerning federal/non-federal coordination, particularly federal aspects of such coordination is warranted. Such guidance could consist of additional coordination procedures, coordination timelines, notice of complete or incomplete submissions, coordination analysis, and streamlined coordination options. In this regard, to the extent needed, we delegate authority to the Wireless Telecommunications Bureau to work with NTIA staff, in collaboration with affected federal agencies, to develop a joint FCC and NTIA public notice with additional information on notification and coordination procedures in the 3.45 GHz band as proposed in prior *Notices* in this proceeding and outlined here in this Second Report and Order.

C. 3.45 GHz Band Plan

1. Block Sizes

58. In the *FNPRM*, the Commission proposed to license the 3.45 GHz band in 20 megahertz blocks to promote efficient and robust use of the band for next-generation wireless technologies, including 5G.¹⁵⁸ We remain committed to that goal, but believe that 10 megahertz blocks will promote wider participation in the 3.45 GHz auction,¹⁵⁹ and will encourage competition in the 3.45 GHz Service while still enabling the deployment of these next-generation wireless services. We also believe this band plan, combined with our decision to license the 3.45 GHz band by partial economic areas (PEAs), strikes the appropriate balance between the 3.7 GHz band, licensed by PEAs in 20 megahertz blocks, and the Citizens Broadband Radio Service, where Priority Access Licenses are licensed by counties in 10 megahertz blocks. We therefore adopt 10 megahertz as the channel size for the 3.45 GHz band in lieu of

¹⁵⁴ See, e.g., 5G Americas Comments at 13-14; AT&T Comments at 8; CTIA Comments at 10; Verizon Comments at 6; T-Mobile Mar. 5, 2021 *Ex Parte* Letter at 6.

¹⁵⁵ NTIA 2021 *Ex Parte* Letter at 4; see T-Mobile Mar. 5, 2021 *Ex Parte* Letter at 6 (supporting expeditious release of a workbook to provide additional information about the parameters in which the DoD will continue to operate).

¹⁵⁶ *Id.*

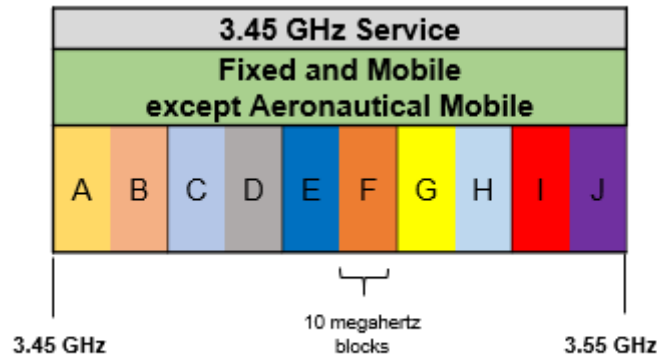
¹⁵⁷ See 47 U.S.C. §§ 305(a), 902(b)(2)(A).

¹⁵⁸ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11098-99, para. 54.

¹⁵⁹ There were 21 winning bidders for the 3.7 GHz band auction, which featured 20 megahertz licenses, but 228 winning bidders in the 3.5 GHz band auction, which featured 10 megahertz licenses. See *Auction of Flexible-Use Service Licenses in the 3.7-3.98 GHz Band Closes*, Public Notice, DA 21-207, AU 20-25 (OEA Feb. 24, 2021) and *Auction of Priority Access Licenses in the 3550-3650 MHz Band Closes*, Public Notice, 35 FCC Rcd 9287 (OEA Sep. 2, 2020).

our proposal of 20 megahertz channels. We will designate these 10 megahertz blocks as A through J, and they will be licensed according to the following channel plan:

Figure 1: Band Plan



59. We find that, for this band, 10-megahertz blocks will best serve our dual goals of making 3.45 GHz spectrum accessible to a diverse array of entities while also enabling licensees to obtain sufficient spectrum rights for deploying wideband networks.¹⁶⁰ Licensing spectrum in smaller blocks will help create opportunities for small carriers to compete for licenses at auction and will allow them to target broadband deployment of this spectrum in rural areas.¹⁶¹ At the same time, 10 megahertz blocks will not inhibit future licensees' flexibility to tailor applications in this band to suit future needs, including for 5G networks, as some commenters suggest.¹⁶² Indeed, for frequencies below 6 GHz, 3GPP has specified 10

¹⁶⁰ See CCA Comments at 5; Dynamic Spectrum Alliance Comments at 5-6; Federated Wireless Comments at 19; New America/Public Knowledge Comments at 2; Southern Linc Comments at 4-5; T-Mobile Comments at 3, 21; WISPA Comments at 3, 10; Letter from Louis Peraertz, Vice President of Policy, WISPA, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 at 1 (Dec. 18, 2020) (WISPA Dec. 18, 2020 *Ex Parte* Letter); T-Mobile Mar. 5, 2021 *Ex Parte* Letter at 2-3.

¹⁶¹ See, e.g., CCA Comments at 5; Dynamic Spectrum Alliance Comments at 5-6; Federated Wireless Comments at 19; New America/Public Knowledge Comments at 2; Southern Linc Comments at 4; T-Mobile Comments at 3, 21; WISPA Comments at 3, 10. The period following public release of the draft of this item saw extensive support for 10 megahertz blocks. See T-Mobile Mar. 5, 2021 *Ex Parte* Letter at 2-3; Letter from David D Rines, Counsel to Southern Linc to Marlene H. Dortch, Secretary, FCC WT Docket No. 19-348 at 2 (Mar. 8, 2021); Letter from Grant B Spellmeyer, Vice President, Federal Affairs & Public Policy, US Cellular to Marlene H. Dortch, Secretary, FCC WT Docket No. 19-348 at 1 (Mar. 8, 2021) (US Cellular Mar. 8 *Ex Parte* Letter); Letter from Alexi Maltas, SVP & General Counsel, Competitive Carriers Association to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 at 2 (Mar. 5, 2021) (CCA Mar. 5, 2021 *Ex Parte* Letter); Letter from Carri Bennet, General Counsel, Rural Wireless Association to Marlene H. Dortch, Secretary, FCC WT Docket No. 19-348 at 2 (Mar. 10, 2021) (RWA Mar. 10 *Ex Parte* Letter) (many RWA members separately filed comments in support of 10 megahertz channels).

¹⁶² 3.7 GHz Service Order, 35 FCC Rcd at 2378, para. 74. Several commenters, agreeing with this approach, argue that this will provide flexibility for manufacturers and licensees to tailor applications in the band to suit future needs. See, e.g., 5G Americas Comments at 18; AT&T Comments at 4; Ericsson Comments at 3-4; NCTA Comments at 2, 11; Nokia Comments at 8; Qualcomm Comments at 3; Verizon Comments at 17. We agree with these commenters that 20 megahertz blocks will best support innovation and investment in next-generation networks. See NCTA Comments at 2, 11.

megahertz among the 13 channel bandwidths suitable for 5G deployments.¹⁶³ 3GPP band n77 specifications, which cover the 3.45 GHz band, also support 10 megahertz blocks.¹⁶⁴

60. Verizon argues that 20 megahertz blocks will better support the deployment of wide-area mobile services than 10 megahertz blocks,¹⁶⁵ and we recognize that some carriers with licenses in the 3.7 GHz band, which is licensed in 20 megahertz blocks, may wish to combine spectrum in these bands. We note that the 3.7 GHz band offered more than double the spectrum of the 3.45 GHz band, allowing wide channels while still enabling a large number of licenses in each license area.¹⁶⁶ While we recognize the benefits of these wide channels, we decline to limit flexibility in the band to achieve them. Carriers will be free to aggregate up to four channels in the 3.45 GHz band to achieve wider blocks as needed to enable their deployments, while others may choose to use only 10 megahertz channels.

61. We also reject Lockheed Martin's suggestion that we assign licenses "in the largest possible block size, preferably one 100-megahertz block," to "simplify planning and coordination" between radar manufacturers such as itself and new flexible-use licensees.¹⁶⁷ Lockheed argues that coordination with holders of smaller blocks would be "complex and costly."¹⁶⁸ As discussed in the context of experimental licensing and Federally-Authorized Contractor facilities, we believe that our experimental licensing rules are sufficient to ensure continued access to this spectrum for radar testing without the need to restrict the number of flexible-use licensees to one per market. We are unpersuaded that the logistical and financial burdens of coordination outweigh the benefits of ensuring spectrum access to a larger number of potential providers, thereby increasing competition in the wireless marketplace. We find that 10 megahertz blocks strike the appropriate balance among minimizing coordination issues, maximizing wide-band services, and increasing competition in the band.¹⁶⁹

2. Spectrum Block Configuration

62. *Unpaired Channels.*—We adopt the Commission's proposal to allocate the 3.45 GHz band on an unpaired basis to promote a consistent spectral environment with the adjacent 3.5 GHz and 3.7 GHz bands, which are also unpaired in the United States.¹⁷⁰ Verizon and Nokia agree with this approach.¹⁷¹ In contrast to a paired channel configuration that assumes frequency division duplex operations, an unpaired spectrum configuration is technology neutral—it thus enables Time Division Duplex (TDD) operations, which has become increasingly prevalent in deployments of digital broadband networks. In light of this, the Commission in recent years has licensed spectrum used for mobile broadband services on an unpaired basis.¹⁷² This more recent approach is consistent with industry standards and supported by the record.¹⁷³ We therefore adopt unpaired channels for this band.¹⁷⁴

¹⁶³ 3GPP TS 38.104 v16.5.0 (2020-11) (Release 16), NR; Base Station (BS) Radio Transmission and Reception, at 36 (5.3.2 Transmission bandwidth configuration), https://www.etsi.org/deliver/etsi_ts/138100_138199/13810101/16.05.00_60/ts_13810101v160500p.pdf.

¹⁶⁴ *Id.*

¹⁶⁵ Verizon Comments at 17.

¹⁶⁶ T-Mobile Mar. 5, 2021 *Ex Parte* Letter at 2-3.

¹⁶⁷ Lockheed Martin Comments at 12.

¹⁶⁸ *Id.*

¹⁶⁹ *See, e.g.*, API/ENTELEC Comments at 2 ("Since broadband access is important, the channelization of five separate 20 MHz wide contiguous blocks using a time-division duplex solution does appear reasonable.")

¹⁷⁰ *See 3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11098, para. 55.

¹⁷¹ Verizon Comments at 18; Nokia Comments at 8.

¹⁷² *See, e.g., Use of Spectrum Bands Above 24 GHz For Mobile Radio Services et al.*, GN Docket No. 14-177 *et al.*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014, 8083, para. 96 (2016) (2016

(continued....)

63. *TDD Synchronization.*—We recognize the benefits to all operators that come from TDD synchronization both within and across bands. To minimize the potential for causing or receiving harmful interference while maintaining deployment flexibility and efficiency, we encourage intra-band synchronization where possible and we require that 3.45 GHz Service licensees negotiate in good faith with requesting Citizens Broadband Radio Service operators¹⁷⁵ to enable TDD synchronization across these services.

64. The record indicates that TDD synchronization, where feasible, may assist in avoiding harmful interference between 3.45 GHz Service and Citizens Broadband Radio Service operations. For example, NCTA argues that TDD synchronization will provide interference protection for low-power Citizens Broadband Radio Service uploads from high-powered 3.45 GHz Band Service downloads.¹⁷⁶ Federated Wireless agrees that synchronization can “avoid much of the interference that is anticipated” between the two services.¹⁷⁷ In light of these concerns, we require 3.45 GHz Service licensees to negotiate in good faith with Citizens Broadband Radio Service neighbors to enable TDD synchronization efforts.¹⁷⁸

65. Specifically, a Citizens Broadband Radio Service operator may request information from a 3.45 GHz Service licensee to enable cross-service TDD synchronization if the Citizens Broadband Radio Service operator provides service, or intends to provide service, in the same or adjacent geographic area as that of the 3.45 GHz Service licensee. A request by a Citizens Broadband Radio Service operator for TDD synchronization will obligate the 3.45 GHz Service licensee to provide sufficient technical information to allow the Citizens Broadband Radio Service operator to synchronize its system with the 3.45 GHz band system and to keep such information current if its network operations change.¹⁷⁹ Negotiations over the information to be provided must be conducted in good faith,¹⁸⁰ with the goal of enabling synchronization between the relevant systems; but there is no obligation on the 3.45 GHz Service licensee to make any changes to its operations or proposed operations. Parties are free to negotiate changes to either or both networks as part of their efforts. Commission staff will be available to assist with negotiations as needed to resolve disputes and ensure good faith cooperation. We similarly encourage industry to keep the Commission apprised of the effectiveness of the good faith requirement adopted today, and we may revise further this rule or the rules governing the Citizens Broadband Radio Service in a future proceeding if necessary to encourage further TDD synchronization efforts among the various services in our mid-band allocations.

(Continued from previous page) _____
Spectrum Frontiers Order); *3.5 GHz Order*, GN Docket No. 12-354, Report and Order and Second Further Notice of Proposed Rulemaking, 30 FCC Rcd 3959, 3989, para. 91; *3.7 GHz Service Order*, 35 FCC at 2378-79, para. 75.

¹⁷³ See, e.g., 5G Americas Comments at 18; AT&T Comments at 4; CTIA Comments at 16; Ericsson Comments at 3; Nokia Comments at 8; Qualcomm Comments at 3; T-Mobile Comments at 3, 21; Verizon Comments at 18. We note that no commenter opposes unpaired configuration.

¹⁷⁴ 3GPP TS 38.101-1 V16.3.0 (2020-03), NR User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone (Release 16).

¹⁷⁵ This includes both Priority Access Licensees and General Authorized Access users. 47 CFR § 96.1(b).

¹⁷⁶ NCTA Comments at 13-18.

¹⁷⁷ Federated Wireless Comments at 14-15.

¹⁷⁸ See T-Mobile Mar. 5, 2021 *Ex Parte* Letter at 4-5 (supporting good faith negotiation process).

¹⁷⁹ We decline to adopt a corresponding requirement for information sharing on the Citizens Broadband Radio Service operator; however, in the absence of reciprocal sharing by the Citizens Broadband Radio Service operator, the initial sharing of information by the 3.45 GHz Service licensee may be sufficient to meet that licensee’s obligation to negotiate in good faith.

¹⁸⁰ See CTIA Mar. 9, 2021 *Ex Parte* Letter at 3.

66. In order to streamline these negotiations and reduce the administrative burdens on 3.45 GHz Service operators, we encourage industry to develop collaborative means of sharing necessary information among licensees and operators. For example, Spectrum Access System administrators may be well-positioned to assist in this effort because they will be collecting extensive data on Citizens Broadband Radio Service operations in order to fulfill their duties. These administrators may be able to act as a clearinghouse for information necessary to effect synchronization. We similarly expect industry to determine the information necessary for such synchronization efforts in order to protect proprietary information of all parties and to facilitate maximum flexibility on the part of licensees, while still ensuring that the interference mitigation objectives of synchronization are achieved. We also encourage industry to identify for the Commission any challenges they face in negotiations.

67. We decline at this time to take the additional step of requiring TDD synchronization between networks operating in this band and those in the adjacent Citizens Broadband Radio Service, as some commenters suggest.¹⁸¹ Mandated synchronization could undermine operator flexibility in determining the best use of this spectrum, especially as use-cases and technologies change over time.¹⁸² While the Commission takes seriously the need to protect operations in the adjacent Citizens Broadband Radio Service from new high-powered uses, we believe the framework we adopt today will accomplish that goal while preserving operator flexibility. However, the Commission will monitor the results of this approach, and may revisit it as necessary based on the experience of operators. To that end, we encourage parties to continue to provide the Commission with information on this approach.

68. *Guard Bands.*—The 3.45 GHz band will be situated between two active bands. At the upper edge of the band, the Citizens Broadband Radio Service operates in the 3.55-3.7 GHz band, and federal incumbents use the 3.55-3.65 GHz band. At the lower edge of the band, the primary allocation for federal radiolocation operations will continue below 3.45 GHz. As the Commission noted in the *FNPRM*, the creation of guard bands is one option for protecting adjacent systems, but such a use of valuable spectrum is inefficient and could be avoided using other technical solutions.¹⁸³ As discussed below, we find that adoption of the technical rules we proposed in the *FNPRM* as modified herein will sufficiently protect adjacent operations at both edges of the band.¹⁸⁴ No commenters support the use of guard bands in this band and we decline to create guard bands here.¹⁸⁵

D. Technical Issues

69. We adopt below technical rules for the 3.45 GHz Service. We find that these rules will encourage efficient use of spectrum resources and promote investment in the band, while protecting incumbent operations in the band and in adjacent bands.

¹⁸¹ See Charter & Cox Comments at 3; NCTA Comments at 3, 13; see also Letter from Danielle Piñeres, NCTA, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 at 2 (Mar. 8, 2021); Letter from Jeffrey H. Blum, DISH Network Corporation to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348, at 6 (Mar. 5, 2021) (DISH March 5, 2021 *Ex Parte* Letter); Open Technology Institute March 5, 2021 *Ex Parte* Letter at 1-2.

¹⁸² See, e.g., 5G Americas Comments at 19; AT&T Comments at 4; Ericsson Comments at 3, 16; T-Mobile Comments at 3.

¹⁸³ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11098-99, para. 57. See also *3.7 GHz Service Order*, 35 FCC Rcd at 2371-72, para. 58 (adopting a guard band at the upper edge of the 3.7-4.2 GHz band to protect earth stations from interference but making no provision for a guard band at the lower edge of the band adjacent to the Citizens Broadband Radio Service).

¹⁸⁴ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11098-99, at para. 57.

¹⁸⁵ See 5G Americas Comments at 19-20; API/ENTELEC Comments at 2; Nokia Comments at 8; NTCA & RWA Comments at 7; Qualcomm Comments at 3; T-Mobile Comments at 3; Verizon Comments at 18-19.

1. Power Levels

70. *Base Station Power.*—To support robust deployment of next-generation mobile broadband services, the Commission in the *FNPRM* proposed to allow base stations in non-rural areas to operate at an effective isotropic radiated power (EIRP) of up to 1640 watts per megahertz.¹⁸⁶ In addition, consistent with other broadband mobile services in nearby bands (e.g., AWS-1, AWS-3, and AWS-4, PCS, and 3.7 GHz), the Commission proposed to permit base stations in rural areas to operate with double the non-rural EIRP limit, with a maximum of 3280 watts per megahertz. Further, the Commission proposed, consistent with the rules adopted in the 3.7 GHz Service, that the adopted power spectral density limit would apply to emissions of all bandwidths, including those of less than one megahertz, to facilitate uniform power distribution across a licensee’s authorized band regardless of whether it deploys wideband or narrowband technologies. In this Second Report and Order, we adopt these proposals. Because advanced antenna systems often have multiple radiating elements in the same sector, these power limits will apply to the aggregate power of all antenna elements in any given sector of a base station, as proposed in the *FNPRM*.¹⁸⁷ We find that these power levels will provide licensees with the flexibility to optimize their network designs for wide-area coverage while still enabling successful coexistence with incumbent and adjacent band operations.

71. As noted in the *FNPRM*, these power levels are the same as those adopted in the 3.7 GHz Service, but they are higher than those permitted in the adjacent Citizens Broadband Radio Service.¹⁸⁸ CTIA states that harmonizing the 3.45 GHz Service power limits with those of the 3.7 GHz Service is essential for this band to achieve its full potential.¹⁸⁹ Verizon asserts that these higher power limits will allow robust deployment of 5G services.¹⁹⁰ These are important considerations as we move forward with the rules for this band.

72. We are not persuaded by the arguments of those commenters opposing higher power limits. They argue that higher power base stations operating in the 3.45 GHz band will cause harmful interference to federal and non-federal operations in the 3.5 GHz band. In particular, they note the potential for receiver blocking effects and the reduction in the spectrum utilization and spatial reuse caused by higher base station transmission power.¹⁹¹ Commenters also expressed concerns about interference to the Environmental Sensing Capability (ESC), which is an integral part of the Citizens Broadband Radio Service.¹⁹² They argue that, if an out-of-band signal from a 3.45 GHz Service device is received by an ESC with sufficient power to trigger it to alert the system as if an incumbent radar system

¹⁸⁶ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11103-04, para. 73.

¹⁸⁷ *Id.* at 11107-08, para. 86.

¹⁸⁸ *Id.* at 11104, para. 75.

¹⁸⁹ CTIA Comments at 14.

¹⁹⁰ Verizon Comments at 12; *see also* T-Mobile Mar. 3, 2021 *Ex Parte* Letter at 2 (supporting high-power operations over broad geographic areas as the “gold standard that has led to U.S. world-class wireless networks” and noting that lower power levels in line with the 3.5 GHz band “would significantly limit the band’s utility for commercial wireless operations and the potential for harmonization with C-band operations”); Letter from Henry Hultquist, AT&T, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348, at 1 (Mar. 9, 2021) (AT&T Mar. 9, 2021 *Ex Parte* Letter); CCA Mar. 5, 2021 *Ex Parte* Letter at 1; CTIA Mar. 9, 2021 *Ex Parte* Letter at 1 (expressing support for the “5G-friendly framework” being applied to this band, in particular “full power commercial operations.”).

¹⁹¹ *See, e.g.*, Federated Wireless Comments at 12-15; Google Comments at 2; NCTA Comments at 4-5.

¹⁹² *See, e.g.*, Federated Wireless Comments at 14; Google Comments at 18-22; Letter from David A. Wright, President, OnGo Alliance, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348, 1 (Mar. 11, 2021) (OnGo Alliance Mar. 11, 2021 *Ex Parte* Letter).

is in operation, it would have the effect of interfering with Citizens Broadband Radio Service operations.¹⁹³

73. While we agree that the asymmetry in power levels between the 3.45 GHz Service and the Citizens Broadband Radio Service creates the potential for harmful interference, we find that the protection mechanisms we adopt herein, including the out-of-band emissions limits adopted below, will minimize such interference. In particular, we believe that harmful interference can be avoided through careful network planning and coordination among spectrum users, including through the requirement we adopt today that 3.45 GHz Service licensees negotiate in good faith regarding requests from Citizens Broadband Radio Service users for technical information necessary to enable TDD synchronization among radio systems. We expect operations in both bands to be diverse and complex, stemming from the use of unpaired blocks resulting in downlink and uplink occurring on the same frequencies, as well as dynamic access in the Citizens Broadband Radio Service. This means that base station power reductions to prevent intra- and inter-service interference will be commonplace, regardless of overall power limits imposed by the Commission. As a result, coordination between users within and across bands will be required for successful coexistence and efficient operation of systems in both bands. Such coordination will also facilitate continued effective ESC operation in and near a 3.45 GHz Service licensee's license area.

74. For this reason, we do not believe the concerns expressed by some commenters justify lowering the power levels proposed in the *FNPRM* for the 3.45 GHz Service.¹⁹⁴ We expect 3.45 GHz Service licensees and Citizens Broadband Radio Service licensees, Spectrum Access Systems, and ESCs to work together to ensure coexistence among systems at the edge of the band. Because the reliable operation of ESCs is essential to enabling spectrum access for licensees of the Citizens Broadband Radio Service, ESCs are subject to protection from harmful interference from adjacent-channel operations as licensee operations. Harmful interference caused to ESC operations will be considered harmful interference to a primary service under our rules and dealt with accordingly.

75. Mirroring the approach adopted for the 3.7 GHz Service, the Commission also proposed to extend the same power spectral density limit to emissions with a bandwidth less than one megahertz to facilitate uniform power distribution across a licensee's authorized band regardless of whether wideband or narrowband technologies are deployed. Ericsson argues that the Commission should allow licensees to use both conducted and radiated power measurements for advanced antenna systems.¹⁹⁵ Others, such as Verizon, oppose this proposal, because a limit based on EIRP alone is technology neutral.¹⁹⁶ Verizon also argues that EIRP provides the clearest method for determining the interference impact to a receiver.¹⁹⁷ We see merit in further study of the most appropriate power limits for advanced antenna systems, as embodied in the hybrid approach proposed by Ericsson, and encourage further submissions related to this proposal for further analysis. We will continue to consider this question as the technology surrounding advanced antenna systems develops. However, we find that the current EIRP limit allows for flexibility in measurement, permitting testers to measure conducted power and apply the relevant antenna gain adjustment, as well as direct over-the-air EIRP measurement. This is consistent with how equipment certification testing is performed in other bands. We therefore decline to adopt Ericsson's proposal at this time.

¹⁹³ See, e.g., Federated Wireless Comments at 14; Google Comments at 18-22; OnGo Alliance Mar. 11, 2021 *Ex Parte* Letter.

¹⁹⁴ See, e.g., Federated Wireless Comments at 12; NCTA Comments at 4-5; Open Technology Institute Comments at 21.

¹⁹⁵ Ericsson Comments at 3.

¹⁹⁶ Verizon Comments at 12.

¹⁹⁷ *Id.*

76. *Mobile Power.*—We adopt a 1 Watt (30 dBm) EIRP power limit for mobile devices, as proposed in the *FNPRM*¹⁹⁸ and as adopted for the 3.7 GHz Service.¹⁹⁹ The record is largely unanimous in supporting the proposal to align the mobile power limit for the 3.45 GHz Service with those of the 3.7 GHz Service.²⁰⁰ For the same reasons that we are adopting our proposed higher power levels in the case of base station power, we do so for mobile devices as well.

77. We find that this mobile power limit will provide an adequate range for operation of different mobile and fixed broadband deployments across a wide variety of use cases. Additionally, this limit will permit operation of mobile power classes as outlined in the 3GPP standards. We also believe a 1 Watt limit is more appropriate for the 3.45 GHz Service than the lower limits imposed in the Citizens Broadband Radio Service due to the expected wider channels and the increased use of advanced antenna systems. As with base station power limits, we believe that providing consistency between mobile 5G deployments in the 3.45 GHz Service and other bands that will be used for these operations is crucial for the band to reach its full potential.²⁰¹ Given that mobile stations typically have low duty cycles and are power controlled by their base stations, the effect of mobile operations in the 3.45 GHz Service on operations in the Citizens Broadband Radio Service should be not be significant.

78. We decline to adopt WISPA's proposal that we add a higher power user device category to support fixed wireless deployments.²⁰² Introducing such a class of device, and its deployment in the band, may complicate coordination with federal users in this and adjacent bands to prevent harmful interference to their operations. In addition, we believe that our mobile power limits will provide sufficient power for fixed wireless broadband operations.

2. Out-of-Band Emissions

79. *Base Station Out-of-Band Emissions.*—We adopt base station out-of-band emission (OOBE) requirements based on the proposed limits from the *FNPRM*, which are similar to those in the AWS services and the 3.7 GHz Service.²⁰³ Specifically, base stations will be required to suppress their emissions beyond the edge of their authorization to a conducted power level of -13 dBm/MHz. Commenters support this proposal.²⁰⁴

80. Further, the *FNPRM* proposed a requirement that 3.45 GHz Service base stations meet an additional two-step limit of -25dBm/MHz and -40dBm/MHz at the upper and lower band edges.²⁰⁵ These limits are consistent with the OOBE limits specified for the Citizens Broadband Radio Service (as implemented for 3GPP band n48).²⁰⁶ As the Commission noted in the *FNPRM*, these OOBE limits are intended to ensure effective coexistence with mission-critical federal and other non-federal services

¹⁹⁸ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11104, para. 76.

¹⁹⁹ *3.7 GHz Band Order*, 35 FCC Rcd at 2470, para. 340.

²⁰⁰ See, e.g., 5G Americas Comments at 16; Qualcomm Comments at 2; Verizon Comments at 12. While some commenters urge the Commission to generally apply Part 96 power levels to the 3.45 GHz Service, no commenters specifically oppose 1 watt EIRP for mobile devices.

²⁰¹ See, e.g., Verizon Comments at 12 (arguing that mobile requirements consistent with those of the 3.7 GHz Service “will ensure that a wide range of devices can be developed and deployed in the band”).

²⁰² WISPA Comments at 25.

²⁰³ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11105, para. 78.

²⁰⁴ See, e.g., Ericsson Comments at 3; T-Mobile Comments at 3; WISPA Comments at 24.

²⁰⁵ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11105, para. 78.

²⁰⁶ 3GPP Standard TS 38.104, version 16.1.0, clause 6.6.4.2.1 for Category A base stations.

operating in the adjacent bands.²⁰⁷ We adopt a two-step limit, but modify it slightly from the original proposal.

81. Commenters are divided on this proposed two-step limit at the band edges. Some oppose the two-step additional limit; they contend that there is no need to apply any additional limit on OOB beyond the band edge.²⁰⁸ These commenters note that our rules for the 3.7 GHz Service do not provide for additional OOB limits²⁰⁹ and argue that none are needed here. Some commenters express concern that this requirement will require U.S.-specific equipment for this band.²¹⁰ Other commenters note the significant impact that relaxed OOB beyond the edges of the band might have on incumbent federal operations and Citizens Broadband Radio Service, and they urge the Commission to provide extra protection as proposed.²¹¹ Nokia acknowledges the need to provide additional protection to adjacent operations and offers two variations of the OOB limit mask.²¹² Nokia considers its stricter OOB mask option to be “achievable” and describes its more relaxed mask to be “preferable.”²¹³

82. We agree with Nokia’s assessment in principle and find that the public interest would be served by a middle ground between these two options, keeping the limit steps at 10 megahertz. This approach strikes an appropriate balance between optimizing use of the 3.45 GHz band and providing protection to adjacent Citizens Broadband Radio Service operations. We also note that adjusting our proposal in this manner will more closely align our rules with 3GPP band n48 by shifting the two-step additional limits by 10 megahertz.

83. Specifically, in addition to the OOB limits within the 3.45 GHz band, the following limits will apply:

- Equal or less than -13 dBm/MHz limit from edge of the band to 10 megahertz down (3440 MHz) and up (3560 MHz);
- Equal to or less than -25 dBm/MHz beyond the 10 megahertz offset from the band edge between 3440 and 3430 megahertz and between 3560 and 3570 megahertz;
- Equal to or less than -40 dBm/MHz below 3430 megahertz and above 3570 megahertz.

We summarize our final approach in Figure 2 below.

²⁰⁷ 3.1-3.55 GHz R&O and FNPRM, 35 FCC Rcd at 11104-06, paras. 77-82.

²⁰⁸ See, e.g., Ericsson Comments at 3; T-Mobile Comments at 30; Verizon Comments at 12; T-Mobile Mar. 5, 2021 *Ex Parte* Letter at 3-4; CTIA Mar. 9, 2021 *Ex Parte* Letter at 3; Letter from Mark Racek, Senior Director Spectrum Policy, Ericsson to Marlene H. Dortch, Secretary, FCC, WT Docket No 19-348, at 1-4 (Mar. 10, 2021) (Ericsson Mar. 10, 2021 *Ex Parte* Letter); AT&T Mar. 9, 2021 *Ex Parte* Letter at 1; Letter from Chris Pearson, President, 5G Americas to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 (Mar. 10, 2021) (5G Americas Mar. 10, 2021 *Ex Parte* Letter).

²⁰⁹ 3.7 GHz Band Order, 35 FCC Rcd at 2471-72, paras. 345-46.

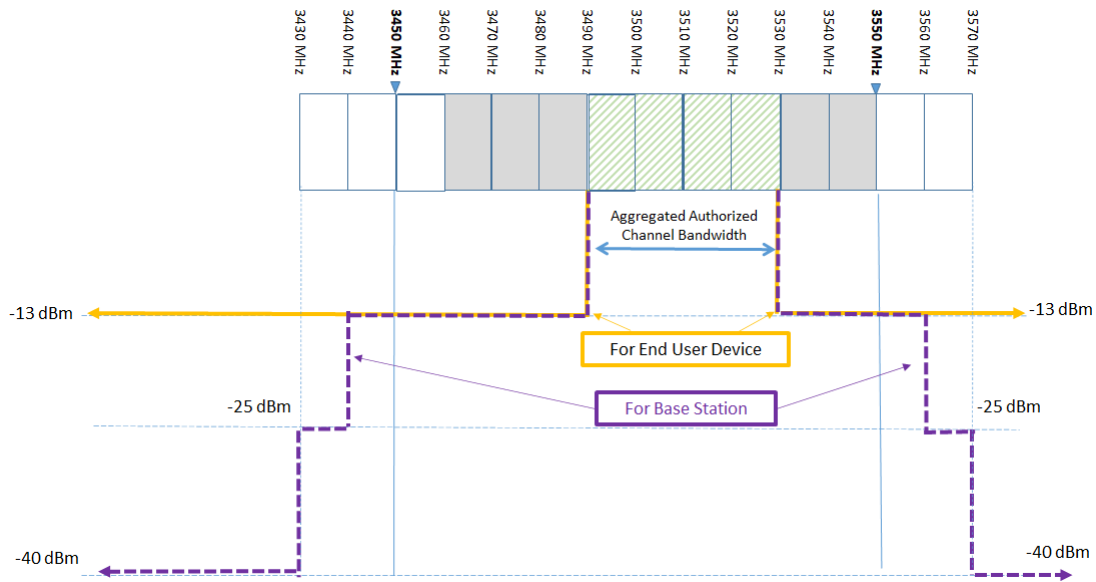
²¹⁰ T-Mobile Mar. 5, 2021 *Ex Parte* Letter at 3-4; CTIA Mar. 9, 2021 *Ex Parte* Letter at 3; Ericsson Mar. 10, 2021 *Ex Parte* Letter at 1-4; AT&T Mar. 9, 2021 *Ex Parte* Letter at 1; 5G Americas Mar. 10, 2021 *Ex Parte* Letter.

²¹¹ Federated Wireless Comments at 13-14.

²¹² Nokia Comments at 9.

²¹³ *Id.* Nokia proposes the same steps in both versions of its mask, with the only variation being the frequency at which the steps would occur (3650 and 3565 for the “achievable” and 3570 and 3575 for the “preferred”).

Figure 2: Emissions Mask



84. We disagree with the suggestion from some commenters that a single -13 dBm/MHz OOB limit would be sufficient. While both the 3.7 GHz and 3.45 GHz bands are adjacent to the Citizens Broadband Radio Service, coexistence scenarios for the 3.45 GHz band are more complicated than those in 3.7 GHz band. This is mainly due to the location of critical federal operations in many coastal and inland areas at the lower edge of the 3.5 GHz band, as well as the increasingly widespread deployment of Citizens Broadband Radio Service operations, especially Priority Access Licensees that will operate in the lower portion of the 3.5 GHz band. While we strive to harmonize our technical rules for 5G among frequency bands in the U.S. as well as globally, to the extent feasible, the nature of the 3 GHz bands within the U.S. likely requires some equipment specialization regardless of the OOB limits. Equipment designed to work across the 3 GHz bands will need to account for the varied rules already in place, including a similar multi-step OOB in the CBRS band. We acknowledge that some commenters have suggested that the two-step OOB limit we adopt here could present challenges for licensees.²¹⁴ The Commission will continue to engage with NTIA and other Federal partners, as well as other stakeholders, on whether there are opportunities to relax this approach while still providing sufficient protection to incumbent users. Moreover, our decision today is specific to the 3.45 GHz band and we take no position on whether the two-step limit adopted here will be required to protect incumbent users in any future proceedings.

85. Further, while we acknowledge the concerns raised by some commenters about the impact of OOB on ESCs in the Citizens Broadband Radio Service,²¹⁵ we believe the lower emissions limits adopted here will sufficiently protect ESC operations.

86. *Mobile Out-of-Band Emissions.*—As with base station OOB limits, we adopt mobile emission limits similar to our standard emission limits that apply to mobile services. Specifically, mobile units must suppress the conducted emissions to no more than -13 dBm/MHz outside their authorized frequency band. Most commenters agree with the proposed OOB limits for mobile stations.²¹⁶ We find that stricter limits, such as those used in Citizens Broadband Radio Service to protect the FSS

²¹⁴ See Ericsson Mar. 10, 2021 *Ex Parte* Letter at 1-2.

²¹⁵ See, e.g., Federated Wireless Comments at 14; Google Comments at 18-22; OnGo Alliance Mar. 11, 2021 *Ex Parte* Letter at 1.

²¹⁶ See, e.g., AT&T Comments at 5-6; Qualcomm Comments at 2-3.

incumbents, are not warranted here because the impact of mobile stations on both commercial and federal systems in adjacent bands should be insignificant.

87. *Emission Measurement.*—For determining OOB, we apply the part 27 measurement procedures and resolution bandwidth that are used for AWS devices outlined in section 27.53(h), with a slight refinement.²¹⁷ Specifically, a resolution bandwidth of 1 megahertz or greater will be used, except in the 1 megahertz bands immediately outside and adjacent to the licensee’s frequency block where a resolution bandwidth of at least 1% of the emission bandwidth may be employed. Nokia argues that the 1% of emission bandwidth would not be appropriate for very wideband carriers—i.e., the 100 megahertz supported by 5G systems.²¹⁸ Instead, Nokia suggests that we consider capping the measurement/resolution bandwidth at 200 kilohertz, so that the measurement bandwidth does not increase for channel bandwidths greater than 20 megahertz. We agree with this observation and refine the measurement procedure to specify the use of a resolution bandwidth such that, at the 1 megahertz bands immediately outside and adjacent to the licensee’s frequency block, a resolution bandwidth of at least 1% of the emission bandwidth—but limited to a maximum of 200 kilohertz—may be employed. Other commenters did not address this issue.

3. Measures to Minimize Effects on Adjacent Channel Operations

88. *Protection of Ongoing Federal Operations in the 3.55-3.65 GHz Band.*—As the Commission noted in the *FNPRM*, the new 3.45 GHz Service will be adjacent to federal inland and shipborne radar operations in the 3.55-3.65 GHz portion of the 3.5 GHz band.²¹⁹ Because these federal systems often operate in a mobile manner, the Cooperative Planning Area and Periodic Use Area model we adopt for in-band interference mitigation will not be effective at providing protection to ongoing federal operations in the adjacent 3.5 GHz band.

89. We believe that the OOB limits we adopt above will provide significant protection from harmful interference for these operations, but that additional measures may be necessary to ensure that flexible-use operations at the upper edge of the 3.45 GHz band do not cause harmful interference to these critical federal operations, particularly in the form of aggregate interference. For that reason, the Commission sought comment in the *FNPRM* on whether additional protection measures are necessary.²²⁰

90. The record does not provide any suggestions for specific mechanisms to ensure protection of these federal systems.²²¹ Commenters point to the work being done by NTIA on an incumbent-informing capability, which would take the place of the ESC sensors used in the Citizens Broadband Radio Service.²²² When implemented, this functionality could also be used to ensure that 3.45

²¹⁷ See 47 CFR § 27.53(h)(3), (4).

²¹⁸ Nokia Comments at 13.

²¹⁹ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11104, para. 77.

²²⁰ *Id.* at 11105-06, para. 79.

²²¹ Several commenters suggest that the Commission resolve this issue by incorporating the 3.45 GHz band into, or apply the rules from, the Citizens Broadband Radio Service. See, e.g., API/ENTELEC Comments at 2; CBRS Alliance Comments at 6-8; Google Comments at 8-9; Letter from Michael Calabrese, Director, Wireless Future Program, New America’s Open Technology Institute, to Marlene H. Dortch, Secretary, FCC, WT Docket No 19-348, at 1-2 (Dec. 21, 2020) (Open Technology Institute Dec. 21, 2020 *Ex Parte* Letter); WISPA Dec. 18, 2020 *Ex Parte* Letter at 1. Because we decline to adopt that proposal for several reasons, this solution is unavailable.

²²² See, e.g., 5G Americas Comments at 14; CBRS Alliance Comments at 8-9; Google Comments at 11-12; Letter from Megan Anne Stull, Counsel, Google, to Marlene H. Dortch, Secretary, FCC, WT Docket No 19-348, at 1-3 (Dec. 17, 2020) (emphasizing that adoption of an incumbent-informing capability would mitigate the inefficient use of mid-band spectrum resources and prevent potential conflicts between Citizens Broadband Radio Service ESC sensors and 3.45 GHz band deployments).

GHz Service operations do not cause interference to federal operations in the 3.5 GHz band as well as those below 3.45 GHz.

91. Given the uncertainty and need for licensee cooperation with federal users, we believe that the best way to address this issue will be through the workshops between the DoD and industry, as well as through the ongoing coordination efforts that will arise from those workshops. We anticipate that these flexible, collaborative discussions will lead to the development of the most innovative and least burdensome methods for preventing harmful interference to adjacent federal operations, balancing deployment flexibility and reliability.

92. *Protection of Ongoing Federal Operations below 3.45 GHz.*—We expect that dynamic spectrum use by federal users will continue below 3.45 GHz in the form of airborne, shipborne, and ground-based radars. As with protection of radar systems in the 3.55-3.65 GHz band, we believe interference mitigation for DoD systems below 3.45 GHz is best handled as part of future workshops and active coordination efforts between industry and the DoD, rather than through proscriptive rules adopted at this stage.

4. Other Technical Rules

93. *Field Strength Limit and Market Boundaries.*—As proposed in the *FNPRM*, we adopt the -76 dBm/m²/MHz power flux density (PFD) limit—at a height of 1.5 meters above ground—at the border of the licensees’ service area boundaries, and we also permit licensees operating in adjacent geographic areas to voluntarily agree to higher levels at their common boundaries.²²³ Commenters agree with this approach.²²⁴ We agree with Verizon that this approach promotes “market-based solutions that will maximize efficient spectrum use and help achieve reliable service along market boundaries.”²²⁵

94. *Antenna Height Limits.*—Consistent with the proposal in the *FNPRM*, we will not restrict antenna heights for 3.45 GHz band operations beyond the requirements necessary to ensure physical obstructions do not impact air navigation safety.²²⁶ This approach is consistent with part 27 AWS rules, which generally do not impose antenna height limits on antenna structures, and is supported by the record.²²⁷

95. Rather than using antenna height limits to reduce interference between mobile service licensees, as has been done in the past, the Commission more recently has used field strength limits at service boundaries to provide licensees more flexibility to design their systems while still ensuring harmful interference protection between systems.²²⁸ As this has proven successful in other services, we adopt that same approach in the 3.45 GHz Service. Further, we believe that such limits would have limited practical effect because we expect that licensees generally will deploy systems predicated on lower tower heights and increased cell density, in order to achieve maximum 5G data throughput to as many consumers as possible. In rural areas where higher antennas may be used to provide longer range to serve sparse populations, the field strength limit at service area boundaries we adopt here will ensure that adjacent area licensees are protected from harmful interference; licensees wishing to use higher antennas must ensure that they do not exceed these limits and cause harmful interference to other licensees. We note, however, that antenna heights may need to be reduced as part of coordination within Cooperative Planning Areas and Periodic Use Areas in order to protect federal operations.

²²³ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11107-08, para. 86.

²²⁴ See, e.g., 5G Americas Comments at 16; T-Mobile Comments at 29.

²²⁵ Verizon Comments at 14.

²²⁶ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11108, para. 87.

²²⁷ See, e.g., 5G Americas Comments at 16; Ericsson Comments at 13; Verizon Comments at 14.

²²⁸ See, e.g., *3.7 GHz Service Order*, 35 FCC Rcd at 2473, paras. 351-53.

96. *Canadian and Mexican Coordination.*—We adopt the proposal from the *FNPRM* to apply section 27.57(c) of our rules to this band,²²⁹ which requires all part 27 operations to comply with international agreements for operations near the Mexican and Canadian borders. This requirement is consistent with all other part 27 services. Under this provision, licensed operations must not cause harmful interference across the border, consistent with the terms of the international agreements currently in force.²³⁰ We note that modification of the existing rules might be necessary in order to comply with any future agreements with Canada and Mexico regarding the use of these bands.

97. *General Part 27 Rules.*—As proposed in the *FNPRM*, we apply all general part 27 rules to all 3.45 GHz Service licenses, including those acquired through partitioning or disaggregation.²³¹ Specifically, we apply to the 3.45 GHz Service sections 27.51 (equipment authorization), 27.52 (RF safety), 27.53(i) (protection of adjacent channels), 27.54 (frequency stability), 27.56 (antennas structures; air navigation safety), and 27.63 (disturbance of AM broadcast station antenna patterns). The record supports this decision,²³² and the application of these general wireless service rules will further the standardization of the 3.45 GHz Service with other commercial wireless services and promote cross-band operability in order to ensure a robust equipment market for licensees and streamline regulatory compliance.

98. As the Commission has done for other bands governed by part 27 services since 2014, we also require client devices to be capable of operating across the entire 3.45 GHz band. Specifically, we add the 3.45 GHz band to section 27.75 of our rules, which requires mobile and portable stations operating in the other flexible-use wireless bands to be capable of operating across the entire relevant band using the same air interfaces that the equipment uses on any frequency in the band.²³³ This requirement does not require licensees to use any particular industry standard. We agree that cross band operability is important to ensure a robust equipment market for all licensees.²³⁴

E. Licensing and Operating Rules; Regulatory Issues

99. As required by the Beat CHINA for 5G Act of 2020,²³⁵ and as part of the Commission's broader comprehensive mid-band strategy to advance 5G networks, we generally align our licensing and operating rules for the 3.45 GHz Service with other flexible-use services. Building on the Commission's previous experience introducing mobile service in bands shared with federal incumbents and adjacent to services with different technical rules, we adopt rules to license new mobile operations under our part 27 rules. With the goal of encouraging intensive investment in, and robust deployment of, wireless networks in the 3.45 GHz band, we adopt rules to afford licensees the flexibility to align their operations with those in other flexible-use bands. Our goal is to harmonize the rules for this band with the rules for other bands that are governed by part 27—most notably, the nearby 3.7 GHz band—as well as other bands that host flexible-use services but are governed by other rule parts, such as the adjacent Citizens Broadband Radio Service.²³⁶ This flexible-use approach will allow licensees to provide any fixed or mobile (except

²²⁹ 47 CFR § 27.57(c).

²³⁰ *Id.*

²³¹ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11108, para. 89.

²³² *See, e.g.*, 5G Americas Comments at 17; Verizon Comments at 14.

²³³ 47 CFR § 27.75.

²³⁴ *See, e.g.*, CCA Mar. 5, 2021 *Ex Parte* Letter at 2; Letter from Grant B Spellmeyer, Vice President – Federal Affairs and Public Policy, US Cellular, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 at 1 (Mar. 2, 2021).

²³⁵ *See* Beat CHINA for 5G Act of 2020 § 905(d)(1)(B).

²³⁶ We decline, however, to adopt the proposals to license only part of the 100 megahertz of the 3.45 GHz band for flexible use pursuant to the framework we adopt today. *See* Letter from Michael Calabrese, Director, Wireless Future Program, New America's Open Technology Institute, to Marlene H. Dortch, Secretary, FCC, WT Docket No

aeronautical mobile) service consistent with the permitted allocations, subject to rules necessary to prevent or minimize harmful interference. If and when areas outside the contiguous United States are made available by the DoD, and if PEAs were subsequently licensed by the Commission, these same licensing rules adopted below would apply.

1. Eligibility

100. As the Commission proposed in the *FNPRM*, we adopt an open eligibility standard for licenses in the 3.45 GHz Service, consistent with established Commission practice. This open eligibility standard does not affect required qualifications, such as citizenship, character, alien ownership, or other generally applicable qualifications that may apply under our rules.²³⁷ The only commenter to address this issue, T-Mobile, supports the Commission’s proposal.²³⁸ This standard will encourage the development of new technologies, products, and services, while helping to ensure efficient use of this spectrum. We will apply the ineligibility provision of our part 27 rules, however, under which a person who, for reasons of national security, has been barred by any agency of the federal government from bidding on a contract, participating in an auction, or receiving a grant “is ineligible to hold a license that is required by [the Spectrum Act] to be assigned by a system of competitive bidding under Section 309(j) of the Communications Act.”²³⁹

2. Mobile Spectrum Holding Policies

101. Spectrum is an essential input for the provision of mobile wireless services, and the Commission has developed policies to ensure that spectrum is assigned in a manner that promotes competition, innovation, and efficient use. The *FNPRM* proposed to not adopt a pre-auction, bright-line limit on the ability of any entity to acquire spectrum in the 3.45 GHz band through competitive bidding.²⁴⁰ It also sought comment on reviewing holdings on a case-by-case basis when long-form applications for initial licenses are filed.²⁴¹ The *FNPRM* further sought comment on whether the 100 megahertz of spectrum that we make available in the 3.45 GHz band should be included in the spectrum screen.²⁴²

102. After careful consideration of the record, and in our expert judgment, we find that it is appropriate to adopt a bright-line, pre-auction limit of 40 megahertz in the 3.45 GHz band, in line with what a diverse group of commenters have proposed.²⁴³ We agree that adopting an in-band spectrum

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19-348 at 1-2 (Mar. 5, 2021) (Open Technology Institute March 5, 2021 *Ex Parte* Letter) (asking the Commission to reserve some portion of the top of the band for either General Authorized Access or Priority Access License use pursuant to the Citizens Broadband Radio Service framework); *see also* Letter from Harold Feld, Senior, V.P., Public Knowledge, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 at 1 (filed Mar. 9, 2021) (Public Knowledge Mar. 9, 2021 *Ex Parte* Letter).

²³⁷ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11109, para. 93.

²³⁸ T-Mobile Comments at 23.

²³⁹ *See* 47 CFR § 27.12(b) (citing 47 U.S.C. § 1404(c)).

²⁴⁰ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11110, para. 95.

²⁴¹ *Id.*

²⁴² *Id.*

²⁴³ *See, e.g.*, NCTA Comments at 4 (suggesting a 3.45 GHz spectrum aggregation limit of 40 megahertz); NCTA Reply at 10-11; CCA Comments at 5-6 (asserting that a 40 megahertz limit is reasonable); CCA Reply at 6-7; Southern Linc Comments at 8 (recommending that potential licensees “be allowed to bid on or acquire a maximum of 40 megahertz of licensed spectrum in the 3.45-3.55 GHz band”); Southern Linc Reply at 6-7; Utilities Technology Counsel Reply at 1, 6-7 (UTC Reply) (supporting a spectrum aggregation limit of 40 megahertz); T-Mobile Mar. 5, 2021 *Ex Parte* Letter at 4 (supporting a 40 megahertz spectrum aggregation limit and noting that it will provide greater certainty and foster greater auction participation); CCA Mar. 5, 2021 *Ex Parte* Letter at 1 (noting “strong support” for the spectrum aggregation limits).

aggregation limit will effectively balance the statutory objectives informing the Commission’s design and implementation of competitive bidding systems because this limit will, for example, help to promote spectrum access and encourage competition in the provision of 5G services, while still supporting the efficient and intensive use of spectrum. Specifically, the Communications Act requires the Commission to examine closely the impact of spectrum aggregation on competition, innovation, and the efficient use of spectrum to ensure that spectrum is assigned in a manner that serves the public interest, convenience, and necessity.²⁴⁴ Section 309(j)(3) of the Act provides that, in designing systems of competitive bidding, the Commission must “include safeguards to protect the public interest in the use of the spectrum,” and must seek to promote various objectives, including “promoting economic opportunity and competition and ensuring that new and innovative technologies are readily accessible to the American people by avoiding excessive concentration of licenses and by disseminating licenses among a wide variety of applicants,” and promoting the “efficient and intensive use” of spectrum.²⁴⁵ Furthermore, for auctions like this one that are subject to the CSEA, the Commission must promote the objective of “the recovery of 110 percent of estimated relocation or sharing costs as provided to the Commission” by NTIA and federal users; without meeting the reserve price, the Commission cannot conclude the auction.²⁴⁶ We find that this pre-auction spectrum limit we adopt today will meet our objectives for this band more effectively than the proposed case-by-case review of post-auction long-form applications.²⁴⁷

103. We acknowledge that the Commission has come to somewhat different conclusions about the application of pre-auction, in-band spectrum aggregation limits to different bands at different times. Our balancing of the various Section 309(j) factors in determining whether and what limits to apply in this band reflects, in part, the importance Congress assigned to rapid deployment of this particular band and the timetable set forth in the Beat China to 5G Act. By replacing case-by-case review with a bright-line *ex ante* limit, we will be able to expedite the licensing of, and deployment by, winning bidders. This approach also reflects our increased emphasis on the statutory factor of promoting dissemination of licenses among a wider variety of applicants, particularly in the rollout of the next generation of wireless broadband service that is expected to play a much greater role in the nation’s economy. In this situation, a pre-auction limit of 40 megahertz effectively balances these statutory factors.

104. More specifically, while the Commission did not adopt pre-auction limits in the AWS-3 band,²⁴⁸ the 3.7 GHz band,²⁴⁹ or in the Spectrum Frontiers proceedings,²⁵⁰ for the various reasons discussed therein, it did establish such limits in other proceedings, based on the assessment that, under the operative circumstances there, such limits would serve the public interest. For example, it established a spectrum reserve of up to 30 megahertz in the 600 MHz Broadcast Incentive Auction to ensure against excessive concentration of below-1-GHz spectrum.²⁵¹ In the CBRS 3.5 GHz band auction, the Commission set a 40 megahertz limit on the aggregation of PALs in order to ensure against excessive concentration within that band, particularly given the unique dynamic sharing scheme in that band, which

²⁴⁴ See 47 U.S.C. §§ 303(g), 307, 308(b), 310.

²⁴⁵ *Id.* § 309(j)(3).

²⁴⁶ 47 U.S.C. § 309(j)(3), (j)(16).

²⁴⁷ *Policies Regarding Mobile Spectrum Holdings Expanding the Economic and Innovation Opportunities of Spectrum through Incentive Auctions*, WT Docket No. 12-269, Report and Order, 29 FCC Rcd at 6133, 6190, para. 135 (2014) (*Mobile Spectrum Holdings Report and Order*).

²⁴⁸ *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6220-21, paras. 222-24.

²⁴⁹ *3.7 GHz Service Order*, 35 FCC Rcd at 2381-84, paras. 83-89.

²⁵⁰ *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Third Report and Order, Memorandum Opinion and Order, and Third Further Notice of Proposed Rulemaking, GN Docket No. 14-177, 33 FCC Rcd 5576 (2018).

²⁵¹ *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6193, para. 146.

included federal and non-federal sharing.²⁵² The 3.45 GHz band also will involve a mechanism for sharing by federal and non-federal users in specific areas. We find that, on balance, the public interest is best served by adopting such a pre-auction spectrum aggregation limit in the 3.45 GHz band. We conclude that a limit of 40 megahertz out of the total of 100 megahertz in the context of the 3.45 GHz band will facilitate competitive access, promote innovation, and lead to a greater diversity of bidders, while at the same time ensuring that the reserve price is met.

105. Various commenters argue that an in-band limit would help facilitate competitive access, encourage participation, promote competition in the provision of 5G services, and further the ability of a wider variety of applicants to obtain licenses.²⁵³ For example, T-Mobile argues that this approach provides greater predictability to bidders, simplifies the Commission's post-auction work, and avoids delays in licensing spectrum.²⁵⁴ We agree with the various commenters' proposed approach of an in-band limit for this spectrum band. We reject Verizon's and AT&T's alternative proposal that we should not establish a pre-auction limit.²⁵⁵ We find that adopting a pre-auction limit for the 3.45 GHz band provides greater certainty and predictability as to which licenses a bidder could win and retain,²⁵⁶ helps provide more opportunities for smaller carriers to compete, and should thereby encourage greater participation by a wider variety of bidders. The approach we take for this auction provides an important opportunity to get additional mid-band spectrum to the market to be put to use quickly, which should help the United States be the global leader in 5G.²⁵⁷

²⁵² 3.5 GHz R&O and FNRPM, 30 FCC Rcd at 3998, para. 117.

²⁵³ See, e.g., T-Mobile Comments at 24 (arguing that if a spectrum screen is used, the Commission should set out a pre-auction limit, rather than undertaking post-auction case-by-case review); T-Mobile Reply at 15-16; U.S. Cellular Reply at 15-16 (asserting that absent adequate spectrum aggregation policies, the increasingly-dominant nationwide providers have both the means and motivation to prevent smaller and regional providers from acquiring the spectrum they need to serve as a competitive counter-balance and to ensure that those living in rural and other underserved areas also have an opportunity to benefit from innovative, and increasingly essential, wireless services); CCA Comments at 5-6 (asserting that a 40 megahertz limit would invite greater participation in the auction by a variety of bidders, promote competition by ensuring at least three licensees in a market, and deter anticompetitive spectrum aggregation); CCA Reply at 6-7; NCTA Comments at 4, 22 (asserting that because mid-band spectrum is essential to the deployment of 5G networks, and the 3.45 GHz band may be the last near-term opportunity to acquire such spectrum, it is appropriate for the Commission to adopt a pre-auction aggregation limit in this band to promote spectrum access by a wide range of market participants and citing 47 U.S.C. § 309(j)(3)(B)); NCTA Reply at 10-11; Southern Linc Comments at 8; Southern Linc Reply at 6-7; UTC Reply at 1, 6-7 (contending that a 40 megahertz spectrum aggregation limit would reasonably balance the interests of both small and large entities, enabling all types of bidders to compete for access to sufficient spectrum in the 3.45 GHz band, and this would be consistent with section 309(j)(3)(B)); NTCA and RWA Comments at 1-3 (arguing that under section 309(j) the Commission must adopt policies that provide smaller carriers a reasonable prospect to obtain 3.45 GHz spectrum); Charter and Cox Comments at 3 (contending that establishing spectrum aggregation limits in the 3.45 GHz band will provide new and smaller carriers with a more level playing field consistent with the Commission's objective to facilitate competition through encouraging new entrants into the wireless space).

²⁵⁴ T-Mobile Comments at 25.

²⁵⁵ Verizon Comments at 20; AT&T Reply at 8-9 (arguing that adopting a 40 megahertz spectrum limit would be inconsistent with 5G deployment needs).

²⁵⁶ *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6192, paras. 139-41.

²⁵⁷ We decline to adopt the bidder-specific spectrum aggregation rules proposed in a post-draft *ex parte* by DISH. See DISH March 5, 2021 *Ex Parte* Letter at 6-7. We believe a pre-auction limit for all bidders, combined with the inclusion of the 3.45 GHz band in our spectrum screen analysis, is a more efficient way of achieving the Commission's goals in this proceeding than a complex set of pre-determined bidder-specific limits. See also Letter from Steve Sharkey, Vice President Government Affairs, T-Mobile to Marlene H. Dortch, Secretary, FCC WT Docket No 19-348 at 5 (Mar. 10, 2021) (describing DISH's proposal as "wholly unworkable and inconsistent" with the Commission's action timeline) (T-Mobile Mar. 10, 2021 *Ex Parte* Letter) and Letter from Michael Goggin,

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106. In addition, in order to prevent any post-auction undermining of in-band limits, and the balancing of statutory factors that they further, we retain the 40 megahertz cap for four years following the auction.²⁵⁸ We acknowledge that our public interest goals in adopting a bright-line limit for this band could be undermined if entities that win 40 megahertz of spectrum at auction could then acquire more 3.45-3.55 GHz spectrum post-auction in the secondary market.²⁵⁹ While the Commission has a general policy of promoting flexibility in secondary market transactions, we find that adopting a holding period of four years, which correlates to the first performance benchmark for 3.45 GHz Service licensees, appropriately balances our public interest goals in setting the pre-auction limit while still retaining flexibility in the secondary market over the medium term.²⁶⁰ Accordingly, we conclude that no entity can hold more than 40 megahertz of 3.45-3.55 GHz spectrum for a period of four years after conclusion of the auction.

107. In the mobile wireless marketplace, the Commission has consistently defined the product market as a combined “mobile telephony/broadband services” market that is comprised of mobile voice and data services, including mobile voice and data services provided over advanced broadband wireless networks.²⁶¹ In this item, we adopt flexible use rules to enable just that—terrestrial mobile use of this spectrum for the deployment of 5G and other upcoming advanced wireless services.

108. Spectrum is an essential input into that provision of wireless services, and for that reason, the Commission has applied a spectrum screen in evaluating proposed secondary market transactions involving spectrum in order to help identify those transactions that raise competitive concerns due to excessive concentration of spectrum. As such, given that the 3.45 GHz band will become “suitable and available in the near term for the provision of mobile telephony/broadband services,”²⁶² we find that including this 100 megahertz of spectrum in the 3.45 GHz band in the input market for spectrum best supports the public interest.²⁶³ We find that the 3.45 GHz spectrum is suitable and available for the

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Counsel for AT&T to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 (Mar. 10, 2021) (describing DISH’s proposal as “self-serving and unjustified” and noting its failure to accurately reflect mid-band spectrum holdings).

²⁵⁸ For purposes of spectrum attribution to a particular entity, all controlling interests and non-controlling interests of 10% or more would be attributable. In addition, interests of less than 10% would be attributable if the interest confers *de facto* control, including but not limited to partnership and other ownership interests and any stock interest in a licensee. 47 U.S.C. § 20.22.

²⁵⁹ We note that, while the four-year prohibition on transfers of licenses in this spectrum band furthers our interest in increasing the diversity of bidders, it does not address the total spectrum aggregation concerns that underlie our application of the spectrum screen in proposed secondary market transactions.

²⁶⁰ The Commission also adopted a holding period of six years for certain 600 MHz licenses, which reflects the interim buildout period for those license holders. *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6212, paras. 196-197.

²⁶¹ See, e.g., *T-Mobile-Sprint Order*, 34 FCC Rcd at 10603, para. 60; *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6224, para. 234.

²⁶² See, e.g., *T-Mobile-Sprint Order*, 34 FCC Rcd at 10608, para. 72; *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6169, 6171-87, paras. 70, 76-125.

²⁶³ Whether spectrum is “suitable,” for purposes of the spectrum screen, “is determined by whether the spectrum is capable of supporting mobile service given its physical properties and the state of equipment technology, whether the spectrum is licensed with a mobile allocation and corresponding service rules, and whether the spectrum is committed to another use that effectively precludes its use for mobile telephony/broadband services. See, e.g., *T-Mobile-Sprint Order*, 34 FCC Rcd at 10608, para. 72; *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6169, para. 71. Whether spectrum is “available” is based on whether it is “fairly certain that it will meet the criteria for suitable spectrum in the near term.” See, e.g., *T-Mobile-Sprint Order*, 34 FCC Rcd at 10608, para. 72 & n.227; *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6169, para. 71.

provision of mobile wireless services in the same manner as other spectrum bands that currently are included in the Commission's spectrum screen as applied to secondary market transactions.²⁶⁴ Accordingly, we will add these 100 megahertz to the spectrum screen once the auction closes. Most commenters support this approach.²⁶⁵

109. We disagree with T-Mobile's argument that the 3.45 GHz band, as "greenfield" spectrum with no existing mobile operations, should not be included in the spectrum screen. T-Mobile argues that a carrier "acquiring spectrum without customers does not alter the competitive landscape" insofar as the spectrum will be deployed to deliver services rather than be warehoused to prevent use by competitors.²⁶⁶ We note the main purpose of the spectrum screen is to act as an analytical tool in helping to identify those markets in which: (1) there could be an increased likelihood that rival service providers or potential new entrants would be foreclosed from expanding capacity, deploying mobile broadband technologies, or entering the market; and (2) rivals' costs could be increased to the extent that they would be less likely to compete robustly.²⁶⁷ As such, what is critical is whether the spectrum is suitable and available in the near term, and not whether it is currently deployed. We find that the 100 megahertz of 3.45-3.55 MHz spectrum will be suitable and available upon conclusion of the auction, and therefore, should be included in the spectrum screen at that point. Taken together, the pre-auction spectrum aggregation limit and four-year prohibition on transfers of 3.45 GHz Service licenses will help promote diversity in bidders while allowing flexibility to engage in secondary market transactions in time, and the inclusion of the spectrum in the spectrum screen will further our interest in continuing to monitor for excessive concentration of spectrum holdings across all bands suitable and available for the provision of mobile wireless services.

3. Geographic Licensing

110. *Use of Geographic Licensing.*—Consistent with the Commission's approach in several other bands used to provide fixed and mobile services, we find that it is in the public interest to license the 3.45 GHz Service on an exclusive, geographic area basis.²⁶⁸ Geographic area licensing provides flexibility to licensees, promotes efficient spectrum use, and facilitates rapid assignment of licenses when using competitive bidding because mutually exclusive applications are received.²⁶⁹ There is wide support in the record for licensing the 3.45 GHz band flexible-use spectrum on an exclusive, geographic basis,²⁷⁰ and we find that such an approach will give certainty to licensees and provide the efficiencies of scale and scope that drive innovation, investment, and rapid deployment of next generation services.

²⁶⁴ While the Commission adopted a 40 megahertz limit on the aggregation of PALs in the CBRS 3.5 GHz band, it did not include that spectrum in the screen because of the unique characteristics of that band, including the three separate tiers of users including Federal incumbents, sophisticated rules for spectrum sharing that include dynamic access for PALs, smaller license areas, and lower power limits. See *3.5 GHz R&O and FNRPM*, 30 FCC Rcd at 398, para. 117 & n.276; *Promoting Investment in the 3550-3700 MHz Band*, Report and Order, GN Docket 17-258, 33 FCC Rcd 10598, 10653 para. 107 (2018) (*CBRS 2018 R&O*). We note that the Commission also established a separate threshold for millimeter wave spectrum pointing to the unique technical characteristics of the millimeter wave spectrum. *2016 Spectrum Frontiers Order*, 31 FCC Rcd at 8083, para. 188.

²⁶⁵ See, e.g., CCA Comments at 7-8; T-Mobile Comments at 4; Verizon Comments at 20; Verizon Reply at 13.

²⁶⁶ T-Mobile Comments at 24.

²⁶⁷ See, e.g., *T-Mobile-Sprint Order*, 34 FCC Rcd at 10617-18, para. 94; *Mobile Spectrum Holdings Report and Order*, 29 FCC Rcd at 6154, 6155, paras. 41, 44-45.

²⁶⁸ See, e.g., 47 CFR § 27.6(h), (i), and (m) (AWS-1, AWS-4, and 3.7 GHz Service bands, respectively).

²⁶⁹ See 47 CFR § 27.6.

²⁷⁰ See, e.g., AT&T Comments at 4; CTIA Comments at 16; Ericsson Comments at 15; Nokia Comments at 8; Verizon Comments at 15.

111. *Geographic License Area.*—In the *FNPRM*, the Commission proposed to issue licenses on a PEA basis for the 3.45 GHz Service.²⁷¹ Based on the record and consistent with the Commission’s proposal, we find that PEAs are the appropriate license area for the technical rules we adopt in this band. In particular, we agree with commenters that, given our decision to adopt higher-powered operation in this band, PEAs will better assist carriers in making the most of the capabilities of 5G networks²⁷² and encourage investment in furtherance of the goals found in section 303(y) of the Communications Act.²⁷³ These higher power levels allow larger coverage areas and encourage providers to take advantage of macro-cell deployments where possible, which are better suited to PEAs than a smaller license area. T-Mobile notes in particular that higher power levels combined with PEA license areas will promote service in rural areas.²⁷⁴

112. Similarly, the availability of spectrum aggregation across other bands with similar technical rules make PEAs a better choice for the 3.45 GHz Service. The 3.7 GHz band, as well as several other recently licensed services, are licensed on a PEA basis, and we find that the goal of facilitating 5G service in the 3.45 GHz band is best served by aligning the band’s rules with those of these bands.²⁷⁵ Several commenters support this decision and agree that aligning the 3.45 GHz band’s rules further with other 5G bands will allow for easier aggregation of these bands by wireless carriers.²⁷⁶

113. For this reason, we are not persuaded that we should license the 3.45 GHz band by counties or by census tracts. Commenters that support licensing by county argue that smaller license areas would allow a wider range of entities to participate in the auction,²⁷⁷ and could benefit small and rural entities by potentially allowing them to obtain spectrum rights at lower prices than if they were required to purchase an entire PEA.²⁷⁸ While we recognize that there are benefits of smaller license areas as a general matter, we decline to adopt license areas smaller than PEAs for the 3.45 GHz band, given our decision to allow higher-powered operations in this band. In this item, we provide other means for small and rural entities to face a more level playing field in the 3.45 GHz band auction, including by adopting a 40-megahertz in-band spectrum aggregation limit and bidding credits for small and rural entities. We similarly decline to adopt the proposal of WISPA to auction only the upper 40 megahertz of the band by counties, while auctioning the rest of the band by PEAs.²⁷⁹ While this proposal offers a potential compromise, it too is inconsistent with our decision to allow higher-powered operations in this band and it would add complexity to the auction and coordination regime.

²⁷¹ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11110-11, para. 96.

²⁷² 5G Americas Comments at 21.

²⁷³ Qualcomm Comments at 3.

²⁷⁴ T-Mobile Reply at 10-11.

²⁷⁵ The Commission licensed on a PEA basis services in the following bands: 600 MHz, 3.7 GHz, 24 GHz, Upper 37 GHz, 39 GHz and 47 GHz.

²⁷⁶ Verizon Comments at 15.

²⁷⁷ See API/ENTELEC Comments at 2; Charter & Cox Comments at 2; CCA Comments at 6; Dynamic Spectrum Alliance Comments at 5-6; Federated Wireless Comments at 19; NCTA Comments at 2; NTCA & RWA Comments at 5-6; Southern Linc Comments at 4; US Cellular Corporation Comments at 2, 10-14; Utilities Technology Counsel Comments at 1; WISPA Comments at 14; WISPA Dec. 18, 2020 *Ex Parte* Letter at 1. See also Letter from Alexi Maltas, SVP & General Counsel, Competitive Carriers Association to Marlene H. Dortch, Secretary, FCC WT Docket No. 19-348 at 2 (Mar. 5, 2021); Letter from Jeffrey Wrestling, Resident Fellow, R Street Institute to Marlene H. Dortch, Secretary, FCC WT Docket No. 19-348, at 1-2 (Mar. 9, 2021); US Cellular Mar. 8 *Ex Parte* Letter; RWA Mar. 10 *Ex Parte* Letter at 2; several RWA members filed similar letters in the docket.

²⁷⁸ NTCA & RWA Comments at 5-6; see also WISPA Dec. 18, 2020 *Ex Parte* Letter at 2.

²⁷⁹ See Letter from Louis Peraertz, Vice President of Policy, WISPA to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348, at 1-3 (Mar. 9, 2021).

114. *Non-CONUS Geographies and the Gulf of Mexico.*—As was noted in the *FNPRM*, the AMBIT efforts focused on licensing the 3.45 GHz band within the contiguous United States only, and for that reason the Commission proposed to exclude Alaska, Hawaii, and the U.S. territories from 3.45 GHz band licensing at this time.²⁸⁰ NTIA recently affirmed that the Gulf of Mexico should not be considered for auction at this time.²⁸¹ While the DoD may conduct further analysis at a later date, its transition plans filed with NTIA do not include areas outside of the contiguous United States or the Gulf of Mexico. As such, the Commission will not issue 3.45 GHz Service licenses in Alaska, Hawaii, the U.S. territories, or the Gulf of Mexico at this time. While many commenters urge us to license this and other mid-band spectrum in areas outside the contiguous United States,²⁸² we believe it would be premature and unwise for the Commission to move beyond the AMBIT agreement in licensing the 3.45- GHz band in areas where the DoD has not committed to clearing or coordinating in the band to allow for its use.²⁸³

115. We recognize, however, that over time more areas may become available for 3.45 GHz band use. In the *FNPRM*, the Commission noted that additional analysis by NTIA and the DoD, in cooperation with industry stakeholders may identify additional Cooperative Planning Areas and Periodic Use Areas outside the contiguous United States.²⁸⁴ To take advantage of any such future analysis that takes place, the Commission sought comment on whether it should delegate authority to the Wireless Telecommunications Bureau and the Office of Engineering and Technology to make any future adjustments to these areas as they deem appropriate²⁸⁵ and several commenters support our doing so.²⁸⁶ In order to maximize future opportunities for 3.45 GHz band access, including in areas not otherwise licensed by our rules, such as PEAs in Alaska, Hawaii, the Gulf of Mexico, and other areas outside the contiguous United States, we therefore delegate authority to the Wireless Telecommunications Bureau and the Office of Engineering and Technology, in coordination with NTIA, to create additional Cooperative Planning Areas and Periodic Use Areas as necessary to facilitate commercial network expansion into areas outside the contiguous United States. These new areas may be created upon notification from NTIA that non-federal operations can occur, either alongside ongoing federal operations or in areas cleared of those operations. We further authorize the Wireless Telecommunications Bureau and the Office of Economics and Analytics to consider applications and assign licenses for the PEAs associated with such additional Cooperative Planning Areas and Periodic Use Areas consistent with the licensing, technical, and competitive bidding rules we adopt today, as such new areas are created for the 3.45 GHz band. Insofar as it becomes necessary to authorize non-federal fixed and mobile (except aeronautical mobile) operations in these new license areas on the basis of rules that differ from the rules adopted here, we delegate authority to the Wireless Telecommunications Bureau and Office of

²⁸⁰ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11111, para. 97.

²⁸¹ NTIA 2021 *Ex Parte* Letter at 1 n.2.

²⁸² See U.S. Territories Service Providers Comments at 2-4; T-Mobile Comments at 26-27. The Commission sought comment on how to mitigate the impact of future 3.45 GHz band licensee operations on federal operations in the Gulf of Mexico. *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11111, para. 97. We received no comments regarding licensing in the Gulf of Mexico.

²⁸³ Verizon suggested the Commission auction “encumbered” licenses for PEAs not covered by the AMBIT agreement. Verizon Comments at 17. We decline to adopt this proposal in order to allow for future auctions that can more accurately reflect the value of this spectrum, as it as ultimately made available.

²⁸⁴ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11111, para. 97.

²⁸⁵ *Id.* at 11095, para. 47.

²⁸⁶ See T-Mobile Comments at 28; US Territories Service Providers Comments at 5. T-Mobile specifically supports delegating authority to WTB and OET “to add other CPAs and PUAs in those areas and then conduct an auction” if NTIA and the DoD are unable to complete the process of assessing the areas in Alaska, Hawaii, the U.S. Territories and Possessions, and the Gulf of Mexico in time for an auction of the 3.45-3.55 GHz band in the rest of the United States.

Engineering and Technology to conduct a rulemaking proceeding to make necessary changes to accommodate federal operations and impose requirements on licenses for those new areas as needed.

4. License Term and Renewal

116. *License Term.*—In the *FNPRM*, the Commission proposed 15-year license terms for the 3.45 GHz Service, which would be consistent with those adopted for the 3.7 GHz Service. As with the 3.7 GHz Service, we believe that additional time for licensees to engage in, and recoup costs for, long-term investments may be necessary here given the need to coordinate federal spectrum usage in this band with affected licensees. We adopt the Commission’s proposal to grant 3.45 GHz Service licenses for 15-year terms. Commenters widely support a 15-year license term.²⁸⁷ 5G Americas explains that a longer term adds predictability, which in turn supports planned network expansion and densification.²⁸⁸ Commenters note that Canada has granted 20-year terms for new 5G licenses in its 3.45-3.65 GHz band,²⁸⁹ and Qualcomm suggests that a 15-year term “will position U.S. providers to be competitive with mobile providers serving other countries and better support the delivery of improved 5G services and security enhancements in the U.S.”²⁹⁰ We find that the application of our standard 15-year license term for flexible-use licenses to the 3.45 GHz Service supports our overall goal of providing uniform licensing rules for this band and other flexible-use bands that predominantly host next-generation wireless networks. We also agree with U.S. Cellular Corporation that providing sufficient time for licensees to realize reasonable returns on their investments is particularly important for spurring investment in rural areas, where returns on investment take longer to achieve as a result of lower population densities in such areas.²⁹¹

117. While no commenter specifically argues for any term other than 15-years, several commenters argue generally for 3.45 GHz licensing rules aligned with the Citizens Broadband Radio Service, which has 10-year license terms. We do not believe that a shorter 10-year license term is appropriate here. The 10-year license term used for the Citizens Broadband Radio Service²⁹² reflected the unique licenses structure in that band, which was particularly suited for innovative use cases, including private networks. A 15-year license term best serves the public interest by providing time needed to recoup investments, especially given the time and effort required to coordinate with the DoD.²⁹³

118. *Renewal.*—As proposed in the *FNPRM*, we will apply our general part 27 renewal requirements for wireless licenses to the 3.45 GHz Service, as the Commission has for the 3.7 GHz Service and the Citizens Broadband Radio Service. We will include the 3.45 GHz Service in the unified renewal framework for Wireless Radio Services. This means that 3.45 GHz Service licensees must comply with section 1.949 of our rules and demonstrate that, over the course of their license term, they either (1) provided and continue to provide service to the public, or (2) operated and continue to operate the license to meet the licensee’s private, internal communications needs.²⁹⁴ Satisfaction with this

²⁸⁷ See, e.g., 5G Americas Comments at 20-21; AT&T Comments at 4-5; CTIA Comments at 17; NTCA & RWA Comments at 6-7; Qualcomm Comments at 3; Verizon Comments at 19.

²⁸⁸ See 5G Americas Comments at 20.

²⁸⁹ See *id.* at 20-21; Qualcomm Comments at 3.

²⁹⁰ Qualcomm Comments at 3.

²⁹¹ U.S. Cellular Corporation Reply at 5.

²⁹² 47 CFR § 96.25(b)(3).

²⁹³ See Verizon Comment at 19 (noting that coordination for systems that remain in the band on a permanent or temporary basis will still take time, which “mitigates in favor of a longer initial license term to ensure that prospective licensees are incentivized to invest in the band, knowing they will have adequate time to deploy their services and seek a return on that investment”).

²⁹⁴ 47 CFR § 1.949.

requirement may be demonstrated either through the renewal showing in section (f) of that rule or the relevant safe harbor found in section (e).²⁹⁵

119. As with other licensing rules we adopt in this item, we find that the application of this renewal standard to the 3.45 GHz Service will help create uniform licensing rules for across flexible-use bands likely to host next-generation wireless networks. We believe the likely use of this band for 5G and other wireless broadband services is well-suited to this renewal framework.²⁹⁶ Commenters support applying part 27 renewal rules to the 3.45 GHz Service.²⁹⁷

5. Performance Requirements.

120. *Traditional Performance Benchmarks.* —In addition to adopting renewal standards, the Commission also establishes performance requirements to ensure that spectrum is used intensely and efficiently. Performance requirements play a critical role in ensuring that licensed spectrum does not lie fallow. The Commission has applied different performance and construction requirements to different bands on a case-by-case basis, based on the unique circumstances surrounding deployment in that spectrum. In the *FNPRM*, the Commission sought comment on what requirements should be applied to the 3.45 GHz Service, proposing to adopt the same requirements as it had applied in the 3.7 GHz Service.

121. Specifically, in the *FNPRM*, the Commission proposed that 3.45 GHz Service licensees offering mobile or point-to-multipoint service provide reliable signal coverage and offer service²⁹⁸ to at least 45% of the population in each of their license areas within eight years of the license issue date (first performance benchmark), and at least 80% of the population in each of their license areas within 12 years of the license issues date (second performance benchmark). For licensees providing fixed service, it proposed that they must demonstrate within eight years of the license issue date that they have four links operating and are providing service where the population within each license area is equal to or less than 268,00 people; where population within the license area is greater than 268,000, it must show that at least one link is in operation and providing service, either to customers or for internal use, for every 67,000 persons within a license area (first performance benchmark). By 12 years after the license issue date, the Commission proposed that point-to-point licensees must have eight links operating and providing service, either to customers or for internal use, if the population within the license area is equal to or less than 268,000, or if the population is greater than this, that it is providing service and has at least two links in operation per every 67,000 persons within a license area (second performance benchmark).

122. While commenters like AT&T and CTIA support the proposal to extend the 3.7 GHz Service performance requirements to licensees in the 3.45 GHz band,²⁹⁹ other commenters argue more generally that the licensing rules for this band should align with those governing the Priority Access

²⁹⁵ *Id.* § 1.949 (e) and (f).

²⁹⁶ Some commenters refer to their support of a “renewal expectancy.” *See, e.g.*, 5G Americas Comments at 21; CTIA Comments at 17; Verizon Comments at 19. We remind future 3.45 GHz Service licensees that we no longer refer to a “renewal expectancy” in our Wireless Radio Service Rules. Instead, a licensee must meet the renewal standard in section 1.949 of our rules. *See Amendment of Pts 1, 22, 24, 27, 74, 80, 90, 95, & 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services*, Report and Order and *FNPRM*, 32 FCC Rcd 8874, 8878-79, para. 11, n. 19 (2017).

²⁹⁷ *See, e.g.*, 5G Americas Comments at 21; AT&T Comments at 4-5; CTIA Comments at 17; Verizon Comments at 19.

²⁹⁸ Service includes service to customers or for internal use.

²⁹⁹ *See, e.g.*, AT&T Comments at 4-5 (supporting application of part 27 licensing and operating rules to the 3.45 GHz band generally); CTIA Comments at 17 (supporting adoption of “flexible interim and final performance requirements that are consistent with the provisions of the part 27 rules and the requirements adopted for other services,” which will ensure that spectrum is intensively and efficiently used).

Licenses in the Citizens Broadband Radio Service.³⁰⁰ For the 3.45 GHz Service, we determine that accelerated performance requirements, as compared to what was proposed in the *FNPRM*, are appropriate.³⁰¹ While we will maintain the proposed signal coverage and link benchmarks, we reduce the timelines under which 3.45 GHz Service licensees must meet the first and second benchmarks. Specifically, 3.45 GHz Service licensees must meet the first performance benchmark at four years after the license issue date and must meet the second performance by at eight years after the license issue date. We find the four- and eight-year timeline will better serve the public interest for several reasons.

123. First, the 3.45 GHz band is not necessarily “greenfield” spectrum, a fact that the Commission has considered when it has adopted longer performance requirement deadlines.³⁰² Rather, much of the 3 GHz band—including the 3.45 GHz band—has already been allocated for 5G use globally, with standard setting and global harmonization well underway and “the technology for 5G deployment in the 3.45[-3.55] GHz band [is] already available in the marketplace.”³⁰³ As discussed above, 3GPP has specified two spectrum operating bands for 5G that overlap with the 3.45 GHz band: band n77 (3.3-4.2 GHz) and band n78 (3.3-3.8 GHz).³⁰⁴ We believe that the potential for economies of scale in the deployment of equipment in this band and adjacent bands can facilitate the widespread deployment of devices and services in this band in the near-term.³⁰⁵ As a result, we anticipate that licensees can meet our revised performance benchmark deadlines.

124. Second, we believe that these reduced timelines will better encourage robust investment and deployment and ensure that this valuable mid-band spectrum does not lie fallow. As discussed, the Commission is working swiftly to be ready to auction this spectrum in 2021 and it has set aggressive timelines for the clearing of secondary, non-federal incumbents; and the DoD is similarly working quickly to prepare this band for rapid deployment. In addition, we believe that our more aggressive performance timelines will further the clear Congressional intent in the Beat CHINA for 5G Act of 2020 not only to make this spectrum available to industry, but also to position it for rapid deployment.³⁰⁶ Making the most of these efforts requires 3.45 GHz licensees to be similarly focused on building out these networks as quickly as possible. As recognized by the wireless industry, rapid deployment using radio spectrum is critical to the U.S. achieving the benefits of 5G.³⁰⁷ Indeed, as Public Knowledge states,

³⁰⁰ See, e.g., Charter and Cox Comments at 1-2; Federated Wireless Reply at 2-6; WISPA Comments at 2-5. Priority Access Licensees must provide “substantial service” to their license area by the end of their license term. 47 C.F.R. § 96.25(b)(4). A “safe harbor” allows, but does not require, these licenses to demonstrate such service by showing they (1) provide signal coverage over 50% of the population in their license area (for mobile or point-to-multipoint service) or (2) have a certain number of links based on the population of the license area. *Id.*

³⁰¹ Open Technology Institute Mar. 5, 2021 *Ex Parte* Letter at 1 (expressing “strong support for the accelerated buildout requirements” in the draft version of this item).

³⁰² See, e.g., *2016 Spectrum Frontiers Order*, 31 FCC Rcd at 8088-90, paras. 203-210 (adopting performance requirements that must be fulfilled by the end of the license term for greenfield millimeter wave spectrum without any mobile operations in the United States).

³⁰³ Letter from Harold Feld, Senior Vice President, Public Knowledge, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 at 2 (Feb. 17, 2021) (Public Knowledge Feb. 17, 2021 *Ex Parte* Letter).

³⁰⁴ 3GPP TS 38.104, NR; Base Station (BS) Radio Transmission and Reception.

³⁰⁵ See, e.g., Verizon Reply at 2-3 (noting that a 3.45 GHz band harmonized with the 3.7 GHz band and n77 global standards would “lead to economies of scale, lower costs for deployment, and more rapid roll-out of new services.” (citing to Global mobile Suppliers Association White Paper, 3300-4200 MHz: A Key Frequency Band for 5G, at 5 (2020))).

³⁰⁶ Beat CHINA for 5G Act of 2020 § 905.

³⁰⁷ See, e.g., Letter from Scott K. Bergman, Senior Vice President, Regulatory Affairs, CITA, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 (Feb. 9, 2021) at attachment, *Building the 5G Economy* at 26 (noting that “every six-month delay in 5G deployment means missing out on \$25 billion of the potential benefits”) and Verizon

(continued....)

the “race to 5G requires not merely a race to allocate spectrum, but a race to actually deploy networks.”³⁰⁸ Public Knowledge supports a four- and eight-year timeline, arguing this is “entirely reasonable for deployment.”³⁰⁹ Third, such aggressive timelines for deployment have been applied to mid-band spectrum before, most recently in the 2.5 GHz band, where the Commission noted that “the critical role of mid-band spectrum in today’s spectrum environment warrants such an approach.”³¹⁰

125. DISH opposes this decision, noting that it results in different timelines for each of the three 3 GHz bands the Commission has made available for flexible-use services, saying there is “no justification” for this approach.³¹¹ We disagree. Each of the three bands is differently situated, and the performance requirements for each are varied as a result: the 3.45 GHz band will be largely cleared and can be deployed using existing equipment and standards, while for the Citizens Broadband Radio Service and 3.7 GHz service, longer periods of time in which to meet performance requirements are justified. Specifically, the 3.5 GHz band framework features innovative services and spectrum sharing, and the 3.7 GHz band requires an extensive clearing period before many deployments can begin.³¹²

126. *Internet-of-Things (IoT) Performance Benchmarks.*—In the *FNPRM*, the Commission also proposed to adopt the IoT alternate performance requirements used for the 3.7 GHz Service³¹³ to give licensees the flexibility to provide services potentially less suited to a population coverage metric.³¹⁴ Specifically, the Commission proposed that 3.45 GHz Service licensees providing IoT-type services could demonstrate that they offer geographic area coverage of 35% of the license area at the first performance benchmark 65% of the license area at the second performance benchmark.³¹⁵ Several commenters support the use of alternate IoT performance requirements.³¹⁶ We agree with Verizon that adopting specific quantifiable benchmarks for different types of operations, as the Commission adopted in 3.7 GHz, “should similarly provide flexibility to new licensees in satisfying the performance requirements, while ensuring the spectrum is timely and robustly put to use.”³¹⁷

127. We adopt the proposed alternative IoT performance metrics but reduce the timeline under which 3.45 GHz Service licensees must meet them, consistent with the timeline we adopt for traditional performance benchmarks. For the same reasons that we reduce the timeline for meeting the first and

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Reply at 22 (noting that “5G deployments in the 3.45-3.55 GHz band are critical to ensuring that the United States maintains its leadership role.”). *See also* Eric Schmidt, *The US’s flawed approach to 5G threatens its digital future*, Financial Times, Feb. 6, 2021 (arguing that “We need aggressive innovative strategies to prompt rapid infrastructure buildout.” And that “if the US auctions more spectrum, insist on getting infrastructure...Future auctions must set stringent build requirements, with penalties for underperformance.”).

³⁰⁸ Public Knowledge Feb. 17, 2021 *Ex Parte* Letter at 2-3 (internal quotations and emphasis omitted).

³⁰⁹ *See id.* at 2 (arguing in favor of a requirement that 40% and 80% of the geographic area be served at four and eight years post-issuance, and for penalties for failure to meet performance benchmarks).

³¹⁰ *Transforming the 2.5 GHz Band*, Report and Order, WT Docket No. 18-120, 34 FCC Rcd 5446, 5485 para. 106 (2019). While the mature ecosystem of equipment that existed for the 2.5 GHz band in 2019 does not yet exist for the 3.45 GHz band, equipment standards have been specified for ranges of spectrum that include the 3.45 GHz band.

³¹¹ DISH Mar. 5, 2021 *Ex Parte* Letter at 7-8.

³¹² *See* T-Mobile Mar. 10, 2021 *Ex Parte* Letter at 4.

³¹³ *See 3.1-3.55 GHz R&O and FNPRM*, 34 FCC Rcd at 11113, para. 102; Appx. A, Final Rules.

³¹⁴ This would include, among other uses, private mobile service.

³¹⁵ *See* Appx. A, Final Rules.

³¹⁶ *See* Southern Linc Comments at 8; Verizon Comments at 19.

³¹⁷ Verizon Comments at 19.

second population coverage and link-based benchmarks, we likewise reduce the timeline for meeting the alternative IoT performance benchmarks to four and eight years after the license issues date, respectively.

128. Some commenters argue that the specific geographic area benchmarks proposed for the alternative IoT performance requirements are too high,³¹⁸ or that we should adopt the “safe harbor” approach taken in the Citizens Broadband Radio Service³¹⁹ rather than impose “bright-line minimums.”³²⁰ We find that the metrics proposed are appropriate³²¹ and will ensure robust use of the 3.45 GHz spectrum. We decline to adjust the requirements down or change their nature. If individual licensees believe their unique deployment situation justifies different standards, they have the option to seek waiver from these rules on a case-by-case basis.

129. *Failure to Meet Performance Requirements.*—Alongside the performance benchmarks we adopt in this item, we also adopt meaningful and enforceable penalties for failing to meet those benchmarks. In the *FNPRM*, the Commission proposed that, in the event a licensee fails to meet the first performance benchmark, its second benchmark and license term would be reduced by two years, thereby requiring it to meet the second performance benchmark two years sooner and its license term would be reduced by two years.³²² If a licensee fails to meet the second performance benchmark, the Commission proposed that its authorization for each license area in which it fails to meet the performance requirement would terminate automatically without Commission action.

130. Given the four- and eight-year timeline we have adopted, we modify slightly this proposal. Accordingly, if the 3.45 GHz Service licensee fails to meet the first performance benchmark (at four years), its second benchmark period will be reduced by one year (i.e., must be met at seven years after the issues date).³²³ Similarly, failure to meet the first performance benchmark will likewise reduce the license term by one year—i.e., the license term would be reduced to 14 years. Consistent with the *FNPRM*, if a 3.45 GHz Service licensee fails to meet the second performance benchmark, its authorization for each license area in which it fails to meet the performance requirements will terminate automatically without Commission action.

131. We also adopt our proposal that, in the event a 3.45 GHz Service licensee’s authority to operate terminates, its spectrum rights should become available for reassignment pursuant to the competitive bidding provisions of section 309(j). Consistent with the Commission’s rules for other part 27 licenses, any 3.45 GHz Service licensee that forfeits its license for failure to meet its performance requirements shall be precluded from regaining that license.³²⁴ T-Mobile supports our proposal to adopt penalties for failing to meet performance benchmarks and specifically supports our approach to relicense spectrum in areas where the licensee failed to meet the performance requirement.³²⁵

³¹⁸ Southern Linc Reply at 8; UTC Comments at 7-8.

³¹⁹ 2018 *CBRS R&O*, 33 FCC Rcd at 10637, para. 69.

³²⁰ Southern Linc Comments at 8

³²¹ See 3.1-3.55 GHz *R&O and FNPRM*, 34 FCC Rcd at 11113, para. 102.

³²² See *id.* at 11113, para. 104.

³²³ While we recognize that circumstances may justify adjustments to this timeline, we are not inclined to grant requests for waiver of this initial benchmark, given that a failure to meet the first benchmark results in acceleration of the second benchmark to seven years post-issue date. We anticipate that licensees unable to meet the initial requirement should be able to meet the final one. Licensees that require a waiver of that second benchmark will be able to request one if necessary.

³²⁴ See, e.g., 47 CFR § 27.14(a) (AWS-1 and AWS-3), (q)(6) (AWS-4), (r)(4) (H Block); 3.7 GHz Service Order, 35 FCC Rcd at 2389, para. 103.

³²⁵ T-Mobile Comments at 28-29. T-Mobile believes that the Commission should not cancel an entire license if a provider is serving customers in part of the license area, but not in others. Instead, T-Mobile recommends a “keep-

(continued....)

132. *Compliance Procedures.*—As it did in the 3.7 GHz Service, the Commission in the *FNPRM* proposed to require 3.45 GHz Service licensees to submit electronic coverage maps that accurately depict both the boundaries of each licensed area and the coverage boundaries of the actual areas to which the licensee provides service or, in the case of a fixed deployment, the locations of the fixed transmitters associated with each link.³²⁶ We adopt this proposal. Each coverage filing must include supporting documentation certifying the type of service that the licensee is providing for each licensed area within its service territory and the type of technology used to provide such service. Supporting documentation must include the assumptions used to create the coverage maps, including the propagation model and the signal strength necessary to provide reliable service with the licensee’s technology. Consistent with our proposed rule, to demonstrate compliance with these performance requirements, licensees must use the most recently available decennial U.S. Census Data at the time of measurement and must base their measurements of population or geographic area served on areas no larger than the Census Tract level.³²⁷ API/ENTELEC, the only commenter to address compliance procedures, supports adopting the compliance procedure framework established for the Citizens Broadband Radio Service.³²⁸ We note that those requirements largely mirror the rules we adopt today.

6. Licensed-By-Rule Use

133. In the *FNPRM*, the Commission sought comment on potentially authorizing “license-by-rule” operations in the 3.45 GHz band.³²⁹ It noted that such opportunistic use of spectrum is permitted in the General Authorized Access tier of the adjacent Citizens Broadband Radio Service. The Commission asked whether this should be permitted generally or where not all spectrum licenses are sold at auction. The Commission asked commenters to explain the effect of allowing such operations on the Commission’s efforts to ensure adequate protection of incumbent and licensee operations from harmful interference, and whether a database or other coordination techniques would create unnecessary burdens on licensees or hinder incumbent protection.

134. Some commenters support this proposal and note that opportunistic access can help to ensure this spectrum is put to immediate and intensive use.³³⁰ Indeed, in our *Report & Order* establishing the Citizens Broadband Radio Service, the Commission stated that “permitting opportunistic access to unused Priority Access channels would maximize the flexibility and utility of the 3.5 GHz Band for the widest range of potential users” and “ensure that the band will be in consistent and productive use.”³³¹

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what-you-serve” approach, under which unserved areas can be relicensed to other providers that believe they can provide service in those areas. We decline to adopt this modification recommended by T-Mobile. Similarly, we decline to adopt Public Knowledge’s proposal that we reduce licenses to only the areas served at the time of the end of the initial license term, and that we allow general authorized access to the remaining areas pursuant to the Citizens Broadband Radio Service Rules. Public Knowledge Mar. 9, 2021 *Ex Parte* Letter at 1. For the reasons discussed below, we decline to allow licensed-by-rule access to this band at this time.

³²⁶ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11111, para. 106; *see also* 47 CFR §§ 1.946(d); 27.14(k).

³²⁷ *See 3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11113, para. 106 & Appx. A; Appx. A, Final Rules; *see also 3.7 GHz Service Order*, 35 FCC Rcd at 2390, paras. 104-106.

³²⁸ *See* API/ENTELEC Comments at 4.

³²⁹ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11110-11, para. 96.

³³⁰ *See, e.g.*, Dynamic Spectrum Alliance at 4 (urging the Commission to extend the Citizens Broadband Radio Service to include a “use-it-or-share it” rule via General Authorized Access); Google Comments at 10 (supporting the use of a Spectrum Access System to allow for General Authorized Access like that of the Citizens Broadband Radio Service); WISPA Comments at 21 (asking the Commission to enable opportunistic use “when and where it is not in use.”); Open Technology Institute Dec. 21, 2020 *Ex Parte* Letter at 2; WISPA Dec. 18, 2020 *Ex Parte* Letter at 1.

³³¹ *3.5 GHz R&O and FNPRM*, 30 FCC Rcd at 3983, para. 72.

Thus, the Commission has not only authorized opportunistic use of locally-unused spectrum in the adjacent CBRS band but also by unlicensed TV White Space operations in the 600 MHz band.³³² These comments make clear, however, that implementing opportunistic use would require the use of some type of automated frequency coordination mechanism, such as the Spectrum Access System that is used in the Citizens Broadband Radio Service, and many commenters oppose such a mechanism because of the reporting burden it places on licensees.³³³ Although Spectrum Access Systems have coordinated opportunistic use of locally unused spectrum in other bands, we decline to adopt this approach in the 3.45 GHz band at this time.

135. In the Citizens Broadband Radio Service band, federal incumbent use is constantly changing, requiring a dynamic spectrum sharing environment and using automated coordination mechanisms to enable that environment. This approach allows the provision of a General Authorized Access tier without imposing additional requirements on Priority Access Licensees. Here, because the DoD and the Commission have worked collaboratively on a different sharing regime in the band, the limited federal operations that remain indefinitely in the band will not require dynamic spectrum sharing. The goal shared by the Commission and the Executive Branch, including the DoD, has been to minimize requirements on licensees to coordinate their operations with third-party systems, thereby allowing maximum opportunities for flexibility in deployment and operational design. Permitting licensed-by-rule operations would require implementing coordination mechanisms similar to the Spectrum Access Systems found in the Citizens Broadband Radio Service. In light of the work that the DoD has done to plan for clearing the band, and our statutory mandate to begin a system of competitive bidding to auction some or all of the 3.45 GHz band by December 31, 2021, we decline to permit licensed-by-rule operations at this time.

136. Similarly, based on the framework developed for this band, permitting licensed-by-rule operations near Cooperative Planning Areas and Periodic Use Areas would limit the ability of the DoD to work directly with licensees to ensure continued access as needed while minimizing the burden on commercial wireless operations. The DoD's work on determining the boundaries of these areas relies on its ability to cooperate with licensees to design and plan its use of the 3.45 GHz band. Although different coordination or exclusion areas might be designed in the future to accommodate opportunistic use enforced by a Spectrum Access System or similar mechanism, we decline at this time to adopt any proposal that would involve licensed-by-rule use in this band. Nevertheless, we recognize that there may be potential opportunities in the future to consider steps we might take, in cooperation with NTIA and other federal partners, to effect an overall rationalization of the non-federal services in the 3 GHz band.³³⁴

7. Applicability of Other Part 27 Rules

137. In the *FNPRM*, the Commission proposed to apply licensing and operating rules that are applicable to all part 27 services to the 3.45 GHz Service.³³⁵ Specifically, these are part 27 rules governing regulatory status, foreign ownership reporting, compliance with construction requirements, permanent discontinuance of operations, partitioning and disaggregation, and spectrum leasing. We adopt this proposal and apply these rules to 3.45 GHz Service licenses and operations. Commenters support applying general part 27 rules to the 3.45 GHz Service.³³⁶ Verizon maintains that harmonized rules across

³³² See *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Report and Order, GN Docket No. 12-268, 29 FCC Rcd 6567, 6843-6844 (2014).

³³³ See, e.g., T-Mobile Comments at 10 (“Automated spectrum access mechanisms should be the exception and not the rule when facilitating commercial access to a band.”); Verizon Comments at 16 (arguing that opportunistic access through a “CBRS-type” system would “complicate and delay full-power 5G deployments”).

³³⁴ See 47 U.S.C. § 316.

³³⁵ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11114, para. 107.

³³⁶ See 5G Americas Comments at 17; Verizon Comments at 14.

bands serves the public interest “by ensuring that market forces, not the disparate impact of varying rules, drive the growth of wireless services.”³³⁷

F. Competitive Bidding Rules

138. The Communications Act requires that we resolve any mutually exclusive applications for new flexible-use licenses in this band through a system of competitive bidding.³³⁸ Consistent with the competitive bidding procedures used by the Commission in previous auctions, we adopt the proposal in the *FNPRM* to conduct any auction for licenses in this band in conformity with the general competitive bidding rules set forth in part 1, subpart Q, of the Commission’s rules.³³⁹ These part 1 rules govern competitive bidding design, application and certification procedures, reporting requirements, and the prohibition on certain communications regarding the auction.³⁴⁰ In addition, our part 1 rules address designated entity preferences and unjust enrichment, and provide a framework for the auction process.³⁴¹ The commenters that address this issue generally support the proposal.³⁴² Consistent with our part 1 rules, we separately consider a Public Notice seeking comment on procedures for an auction of new licenses in this band, thereby beginning the separate pre-auction process.³⁴³

139. Given the record and our experience in successfully conducting auctions pursuant to the part 1 rules, we adopt the Commission’s proposal to employ those rules when developing the auction for new licenses in this band. Should the Commission subsequently modify its general competitive bidding rules, the modifications would apply here as well. If and when areas outside the contiguous United States are made available by the DoD, the part 1 rules would similarly apply to any PEAs licensed by competitive bidding in those areas.

140. As the Commission observed in the *FNPRM*, under the Commercial Spectrum Enhancement Act (CSEA), federal entities operating on certain frequencies that have been reallocated from federal to co-primary federal and non-federal use and assigned by the Commission through auction are eligible for reimbursement for the cost of relocating or sharing their operations.³⁴⁴ In order to provide for such reimbursement, the Communications Act requires that the “total cash proceeds” from the auction of these frequencies must equal at least 110% of the estimated relocation or sharing costs of incumbent federal operations.³⁴⁵ Based on the current allocation of the 3.45 GHz band for uses by the DoD and the DoD’s planned sharing arrangements and relocation of some operations out of the band to make way for commercial use as part of the AMBIT agreement, this spectrum qualifies as eligible frequencies under the CSEA. Accordingly, the reserve price for any auction of 3.45 GHz band licenses at a minimum will be 110% of expected federal relocation costs, based on the estimate of relocation costs provided to the

³³⁷ See Verizon Comments at 14.

³³⁸ 47 U.S.C. § 309(j)(1).

³³⁹ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11114, para. 108.

³⁴⁰ See 47 CFR §§ 1.2101-1.2114.

³⁴¹ See *id.*

³⁴² See 5G Americas Comments at 21-22; Verizon Comments at 20; WISPA Comments at 20-21. As we decline to adopt a Citizens Broadband Radio Service-like licensing framework for the 3.45 GHz band, we likewise decline to adopt API/ENTELEC’s proposal to align our rules for the auction of 3.45 GHz Service licenses with those used for Priority Access Licenses in Auction 105. See API/ENTELEC Comments at 4.

³⁴³ *Auction of Flexible-Use Service Licenses in the 3.45-3.55 GHz Band for Next-Generation Wireless Services; Comment Sought on Competitive Bidding Procedures for Auction 110*, AU Docket No. 21-62, Public Notice, FCC 21-33 (2021) (Mar. 17, 2021) (*Auction Comment Public Notice*).

³⁴⁴ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11114, para. 109; see also 47 U.S.C. § 923(g)(1)-(2).

³⁴⁵ 47 U.S.C. § 309(j)(16)(B). The Beat CHINA for 5G Act of 2020 expressly reaffirmed this requirement. Beat CHINA for 5G Act of 2020 § 905(d)(3).

Commission by NTIA consistent with the CSEA.³⁴⁶ In the public notice seeking comment on procedures for an auction of new licenses in this band being separately considered, we seek comment on setting that aggregate reserve price at \$14,775,354,300.³⁴⁷

141. *Designated Entity Provisions.*—In the *FNPRM*, the Commission sought comment on whether to offer bidding credits to designated entities in any auction of new licenses in this band.³⁴⁸ When authorizing the Commission to use competitive bidding, Congress required that the Commission “ensure that small businesses, rural telephone companies, and businesses owned by members of minority groups and women are given the opportunity to participate in the provision of spectrum-based services.”³⁴⁹ Based on the Commission’s prior experience with the use of bidding credits in spectrum auctions, we find that using bidding credits is an effective tool to achieve the statutory objective of promoting participation of designated entities in the provision of spectrum-based services.³⁵⁰

142. *Small Businesses.*—One way the Commission fulfills this mandate is through the award of bidding credits to small businesses. In the *Competitive Bidding Second Memorandum Opinion and Order*, the Commission stated that it would define eligibility requirements for small businesses on a service-specific basis, taking into account the capital requirements and other characteristics of each particular service in establishing the appropriate threshold.³⁵¹ Further, in the *Part 1 Third Report and Order* and the more recent *Competitive Bidding Update Report and Order*, the Commission, while standardizing many auction rules, determined that it would continue to use a service-by-service approach to defining small businesses.³⁵² In the *FNPRM*, the Commission proposed to adopt bidding credits for the larger two of the three designated entity business sizes provided in the part 1 rules.³⁵³

³⁴⁶ 47 U.S.C. § 923(g)(3).

³⁴⁷ *Auction Comment Public Notice*, at paras. 29, 34.

³⁴⁸ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11115-16, para. 110.

³⁴⁹ 47 U.S.C. § 309(j)(4)(D). In addition, Section 309(j)(3)(B) of the Communications Act provides that, in establishing eligibility criteria and bidding methodologies, the Commission shall seek to promote several objectives, including “economic opportunity and competition . . . by avoiding excessive concentration of licenses and by disseminating licenses among a wide variety of applicants, including small businesses, rural telephone companies, and businesses owned by members of minority groups and women.” *Id.* § 309(j)(3)(B).

³⁵⁰ In the *Competitive Bidding Update Report and Order*, the Commission adopted a process for establishing a reasonable monetary limit or cap on the amount of bidding credits that an eligible small business or rural service provider may be awarded in any particular auction. *Updating Part 1 Competitive Bidding Rules*, WT Docket No. 14-170, Report and Order, 30 FCC Rcd 7493, 7539-44, paras. 110-21 (2015) (*Competitive Bidding Update Report and Order*). The Commission established the parameters to implement a bidding credit cap for future auctions on an auction-by-auction basis. *Id.* Consistent with the Commission’s longstanding approach, the Public Notice seeking comment on auction procedures solicits public input on the appropriate amount of the bidding credit caps.

³⁵¹ *Implementation of Section 309(j) of the Communications Act—Competitive Bidding*, PP Docket No. 93-253, Second Memorandum Opinion and Order, 9 FCC Rcd 7245, 7269, para. 145 (1994); *see also* 47 CFR § 1.2110(c)(1).

³⁵² *Competitive Bidding Update Report and Order*, 30 FCC Rcd at 7521, para. 65; *Amendment of Part 1 of the Commission’s Rules – Competitive Bidding Procedures*, WT Docket No. 97-82, Third Report and Order, 13 FCC Rcd 374, 388, para. 18 (1997); 47 CFR § 1.2110(c)(1).

³⁵³ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11115-16, para. 110. Section 1.2110(f)(2) sets out a standardized schedule of bidding credits that includes three size definitions that may be used in specific services: businesses with average annual gross revenues for the preceding three years not exceeding \$4 million would be eligible for a 35% bidding credit, businesses with average annual gross revenues for the preceding three years not exceeding \$20 million would be eligible for a 25% bidding credit, and businesses with average annual gross revenues for the preceding three years not exceeding \$55 million would be eligible for a 15% bidding credit. 47 CFR § 1.2110(f)(2); *see also* *Competitive Bidding Update Report and Order*, 30 FCC Rcd at 7524, para. 74.

143. In adopting competitive bidding rules for other spectrum bands that will be used for 5G services, the Commission included provisions for designated entities to promote opportunities for small businesses, rural telephone companies, and businesses owned by members of minority groups and women to participate in the provision of spectrum-based services.³⁵⁴ For example, the Commission adopted two small business definitions for the auction of licenses in the 3.7 GHz band.³⁵⁵ These two small business definitions are the higher two of the three small business average gross revenues thresholds in the Commission's standardized schedule of bidding credits.³⁵⁶

144. We adopt the proposal in the *FNPRM* to apply the two small business definitions with higher average gross revenues thresholds to auctions of overlay licenses in the 3.45 GHz band.³⁵⁷ Accordingly, an entity with average annual gross revenues for the preceding five years not exceeding \$55 million will qualify as a "small business," while an entity with average annual gross revenues for the preceding five years not exceeding \$20 million will qualify as a "very small business." Since their adoption in 2015, we have used these gross revenue thresholds in auctions for licenses likely to be used to provide 5G services in a variety of bands.³⁵⁸ The results in these auctions indicate that these gross revenue thresholds have provided an opportunity for bidders claiming eligibility as small businesses to

³⁵⁴ See *3.7 GHz Service Order*, 35 FCC Rcd at 2374-76, paras. 65-69; *2016 Spectrum Frontiers Order and FNPRM*, 31 FCC Rcd at 8100-01, paras. 65-69; *2016 Spectrum Frontiers Order and FNPRM*, 31 FCC Rcd at 8100-01, paras. 249-50 (defining a small business qualifying for a 15% bidding credit as one with no more than \$55 million in average annual gross revenues for the preceding three years and a very small businesses qualifying for a 25% bidding credit as one with no more than \$20 million in average annual gross revenues for the preceding three years); see also 47 U.S.C. § 309(j)(4)(D).

³⁵⁵ See *3.7 GHz Service Order*, 35 FCC Rcd at 2374-76, paras. 65-68.

³⁵⁶ See 47 CFR § 1.2110(f)(2)(i).

³⁵⁷ The Commission sought U.S. Small Business Administration (SBA) consultation on these proposed size standards, as required by the Small Business Act, 15 U.S.C. § 632(a)(2)(c), and 13 CFR §§ 121.901-903. See Letter from Gary D. Michaels, Deputy Chief, Auctions Division, Office of Economics and Analytics, FCC, to Khem R. Sharma, Chief, Office of Size Standards, U.S. Small Business Administration (Sept. 14, 2020); Letter from Khem R. Sharma, Chief, Office of Size Standards, U.S. Small Business Administration, to Gary D. Michaels, Deputy Chief, Auctions and Spectrum Access Division, Wireless Telecommunications Bureau, FCC (Jan. 8, 2021). The standardized schedule of bidding credits provided in section 1.2110(f)(2)(i) defines small businesses based on average gross revenues for the preceding three years. In December 2018, Congress revised the standard set out in the Small Business Act for categorizing a business concern as a "small business concern," by providing as a general matter that a federal agency cannot propose to categorize a business concern as a "small business concern" for Small Business Act purposes unless the size of the concern is based on its annual average gross receipts "over a period of not less than 5 years." 15 U.S.C. § 632(a)(2)(C)(ii)(II), as amended by Small Business Runway Extension Act of 2018, Pub. L. 115-324 (Dec. 17, 2018). In December 2019, the SBA adopted new rules implementing the requirements of the Small Business Runway Extension Act and modifying its method for calculating average annual receipts used to prescribe size standards for small businesses from a 3-year to a 5-year average period. Small Business Administration, *Small Business Size Standards: Calculation of Annual Average Receipts*, 84 FR 66561 (Dec. 5, 2019). To implement the proposal in the *FNPRM* consistent with this statutory requirement and with SBA's new rules, average annual gross revenues for purposes of small business bidding credits in this band will be based on the preceding five years.

³⁵⁸ See *Incentive Auction of Upper Microwave Flexible Use Service Licenses in the Upper 37 GHz, 39 GHz, and 47 GHz Bands for Next-Generation Wireless Services*, AU Docket No. 19-59, Public Notice, 34 FCC Rcd 2656, 2660-61, paras. 12-14 (2019) (*Auction 103 Comment Public Notice*); *Auctions of Upper Microwave Flexible Use Licenses for Next-Generation Wireless Services*, AU Docket No. 18-85, Public Notice, 33 FCC Rcd 4103, 4113-14, para. 30 (2018) (*Auctions 101 and 102 Comment Public Notice*); *Competitive Bidding Update Report and Order*, 30 FCC Rcd at 7523, para. 72 (noting the thresholds adopted in that Order would be used in the auction of 600 MHz licenses that was part of the broadcast incentive auction).

win licenses to provide spectrum-based services at auction.³⁵⁹ Furthermore, by adopting thresholds that are not overly inclusive of qualified bidders, we preserve the effectiveness of designated entity benefits for the parties that our designated entity rules are intended to benefit.³⁶⁰

145. We decline to adopt Lockheed Martin's proposal to offer a bidding credit to 3.45 GHz Service licensees that agree to accommodate experimental operations in the band.³⁶¹ As the Commission stated in the *FNPRM*, we expect future licensees to negotiate with experimental authorization applicants, consistent with the regulatory status afforded primary users versus experimental licenses under our rules.³⁶² Our experimental authorization process affords the opportunity to develop new technologies while protecting incumbent services and Lockheed Martin has not shown why this process should be modified through the use of bidding credits.³⁶³

146. We also adopt the proposal in the *FNPRM* to provide qualifying "small businesses" with a bidding credit of 15% and qualifying "very small businesses" with a bidding credit of 25%, consistent with the standardized schedule in part 1 of our rules.³⁶⁴ This proposal, supported by WISPA,³⁶⁵ was modeled on the small business size standards and associated bidding credits that the Commission adopted for a range of other services.³⁶⁶ We believe that this two-tiered approach has been successful in the past, and we will employ it once again. We believe that use of the small business tiers and associated bidding credits set forth in the part 1 bidding credit schedule will provide consistency and predictability for small

³⁵⁹ See 47 U.S.C. § 309(j)(4)(D) (bidding preferences for small businesses used to create opportunities to participate in the provision of spectrum-based services); see also *Auction of 24 GHz Upper Microwave Flexible Use Service Licenses Closes*, AU Docket No. 18-85, Public Notice, 34 FCC Rcd 4294, Attach. A (WTB/OEA 2019) (six of 29 winning bidders claimed eligibility for small business bidding credits); *Winning Bidders Announced for Auction of 28 GHz Upper Microwave Flexible Use Service Licenses (Auction 101)*, AU Docket No. 18-85, Public Notice, 34 FCC Rcd 4279, Attach. A (WTB/OEA 2019) (six of 33 winning bidders claimed eligibility for small business bidding credits); *Incentive Auction Closing and Channel Reassignment Public Notice*, AU Docket No. 14-252, Public Notice, 32 FCC Rcd 2786, Attach. B (IATF/MB/WTB 2017) (15 of 50 winning bidders for 600 MHz licenses claimed eligibility for small business bidding credits).

³⁶⁰ See *Incentive Auction of Upper Microwave Flexible Use Service Licenses in the Upper 37 GHz, 39 GHz, and 47 GHz Bands for Next-Generation Wireless Services*, AU Docket No. 19-59, Public Notice, 34 FCC Rcd 9626, Attach. A (WTB/OEA 2019) (20% of qualified bidders claimed eligibility for a small business bidding credit); *Auction of 24 GHz Upper Microwave Flexible Use Service Licenses for Next Generation Wireless Services*, AU Docket No. 18-85, Public Notice, 34 FCC Rcd 933, Attach. A (WTB/OEA 2019) (just under 20% of qualified bidders claimed eligibility for a small business credit); *Auction of 28 GHz Upper Microwave Flexible Use Service Licenses for Next Generation Wireless Services*, AU Docket No. 18-85, Public Notice, 33 FCC Rcd 10968, Attach. A (WTB/OEA 2018) (20% of qualified bidders claimed eligibility for a small business bidding credit).

³⁶¹ Lockheed Martin Comments at 15.

³⁶² See *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11086-87, para. 21. The Commission noted that that Office of Engineering and Technology staff have historically worked to mediate disputes between parties and will continue to do so in the future. *Id.*

³⁶³ Regarding Moise Advisory's proposal that we increase the bidding credit cap to a minimum of \$200 million (see Moise Advisory Comments at 2, 3), we will seek comment on the bidding credit cap in the Comment PN, consistent with our typical practice.

³⁶⁴ See *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11115-16, para. 110; see also 47 CFR § 1.2110(f)(2)(i)(B), (C).

³⁶⁵ WISPA Comments at 21.

³⁶⁶ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11115-16, para. 110; see, e.g., *3.7 GHz Service Order*, 35 FCC Rcd at 2374-76, paras. 65-68; *Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands*, WT Docket No. 02-353, Report and Order, 18 FCC Rcd 25162, 25220, para. 149 (2003) (*AWS-1 Service Rules R&O*); *AWS-4 Service Rules R&O*, 27 FCC Rcd at 16185, para. 217 (adopting the AWS-1 size standards and associated bidding credits for small businesses for any AWS-4 licenses awarded through competitive bidding).

businesses. No commenter provides any alternative or reason why the bidding credit thresholds or small business definitions that we adopt would not work in this service.

147. *Rural Service Providers.*—In the *FNPRM*, the Commission also sought comment on a proposal to offer a bidding credit for rural service providers.³⁶⁷ The rural service provider bidding credit awards a 15% bidding credit to those that service predominantly rural areas and that have fewer than 250,000 combined wireless, wireline, broadband and cable subscribers.³⁶⁸ As a general matter, the Commission “has made closing the digital divide between Americans with, and without, access to modern broadband networks its top priority . . . [and is] committed to ensuring that all Americans, including those in rural areas, Tribal lands, and disaster-affected areas, have the benefits of a high-speed broadband connection.”³⁶⁹ WISPA supports this proposal as consistent with the Commission’s approach in other flexible-use bands.³⁷⁰

148. We find that a targeted bidding credit will better enable entities already providing rural service to compete for spectrum licenses at auction, and in doing so, will increase the availability of 5G service in rural areas. Accordingly, we will apply the rural service provider bidding credit in auctions of new licenses in this band.

G. Relocation of Secondary Non-Federal Radiolocation Operations

149. In the *Report and Order*, the Commission determined that the public interest would be best served by relocating secondary non-federal radiolocation licensees from the 3.3-3.55 GHz band to the 2.9-3.0 GHz band, in preparation for the new 3.45 GHz Service. The Commission simultaneously sought comment on the timing and cost of this decision and on modifying the licenses pursuant to our section 316 authority.³⁷¹ We discuss these issues in turn below.

1. Timing of Relocation

150. In the *Report and Order*, the Commission determined that secondary radiolocation licensees would be relocated to the 2.9-3.0 GHz band. In the *FNPRM*, it proposed that authorization for these secondary, non-federal radiolocation operations in the to-be-cleared spectrum would cease on a date consistent with the first possible grant of flexible-use authorizations to new users in the band.³⁷² As an example, the Commission noted that a licensing scheme that would result in an auction would see non-federal radiolocation use sunset within 90 days of the close of the auction,³⁷³ because that date is “consistent with the first possible grant of flexible-use authorizations.”³⁷⁴

151. NBCUniversal and Nexstar Broadcasting argue that 90 days after the auction closes is insufficient for them to take the steps needed to relocate their Doppler radar systems.³⁷⁵ For example, NBCUniversal projects that it will take 18 months total for its transition given the production and procurement of equipment needed to transition NBCUniversal’s four Doppler weather radar sites to the

³⁶⁷ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11115-16, para. 110.

³⁶⁸ *Competitive Bidding Update Report and Order*, 30 FCC Rcd at 7530, para. 88.

³⁶⁹ *Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, GN Docket No. 18-238, 2019 Broadband Deployment Report, 34 FCC Rcd 3857, 3858, para. 1 (2019).

³⁷⁰ WISPA Comments at 21.

³⁷¹ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11099, para. 59.

³⁷² *Id.* at 11099, para. 60.

³⁷³ *Id.*

³⁷⁴ *Id.* at 11088, para. 26.

³⁷⁵ See NBCUniversal Comments at 5-6; NBCUniversal Reply at 5-6; Nexstar Comments at 8.

2.9-3.0 GHz band, labor to manufacture and install new equipment, and equipment certification testing for its new operations.³⁷⁶ NBCUniversal explains that, given its move below 3 GHz, equipment cannot be reused and new equipment must be procured and purchased, and notes that lead-time for production of one key component for its radar system alone is 10 months.³⁷⁷ Nexstar projects that its transition will take 12-15 months for its one radar system.³⁷⁸ NBCUniversal and Nexstar argue that they should be permitted to continue operations until such time that flexible-use licenses are prepared to deploy services in the relevant markets, or in the alternative, asks the Commission to establish a sunset date of at least 180 days (i.e., 6 months) after new flexible-use licenses in the relevant markets are granted.³⁷⁹ They argue that the date licenses are granted is of more relevance to when new wireless operations can commence rather than merely the close of an auction. Verizon and T-Mobile disagree and instead support sunsetting the radiolocation services' authorization within 90 days of the close of the auction, which they argue aligns with when license grants often occur, consistent with the *FNPRM*'s proposal.³⁸⁰

152. We find persuasive the arguments raised by Nexstar and NBCUniversal regarding the amount of time needed to successfully complete their transitions. We find the public interest will be best served by adopting a sunset date of the secondary radiolocation authorization 180 days after the new flexible-use licenses are granted. We also delegate authority to the Office of Engineering and Technology to cease certifying radiolocation equipment for the 3.45 GHz band 180 days after the new flexible-use licenses are granted. Secondary radiolocation users and the new flexible-use licenses in a given market may of course enter into private agreements to complete the relocation process sooner.

153. The Commission sought comment in the *FNPRM* on interim timing and benchmarks for the transitioning of secondary, non-federal radiolocation operations out of the 3.3-3.55 GHz band. No commenter suggests any such specific interim benchmarks or deadlines³⁸¹ and we find no need to adopt any given the limited number of licensees that need to be transitioned. Secondary, non-federal radiolocation licensees must relocate their operations by the sunset date.

2. Relocation Reimbursement

154. In the *FNPRM*, the Commission sought comment on whether to require new flexible-use licensees to reimburse secondary, non-federal radiolocation operators for their relocation costs pursuant to our *Emerging Technologies* framework, despite the secondary status of these operations.³⁸² We find that, in this unique instance, the public interest is served by requiring new flexible-use licensees to reimburse secondary, non-federal radiolocation users for their reasonable relocation expenses, particularly given the

³⁷⁶ NBCUniversal Comments at 6. It notes that there is a long lead-time for some of the parts needed to relocate—acquiring the klystron tubes typically takes up to ten months from the time the order is placed. Letter from Margaret L. Tobey, Senior Vice President, NBCUniversal to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348, at 2-3 (Feb. 17, 2021) (NBCUniversal Feb. 17, 2021 *Ex Parte* Letter).

³⁷⁷ NBCUniversal Feb. 17, 2021 *Ex Parte* Letter at 2-3.

³⁷⁸ Nexstar Comments at 8.

³⁷⁹ Letter from Henry Gola, Counsel for Nexstar Media to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 (Mar. 9, 2021) (writing on behalf of Nexstar and NBCUniversal to note support for the 180-day timeline as sufficient to allow for relocation) (Nexstar/NBCU Mar. 9, 2021 *Ex Parte* Letter).

³⁸⁰ T-Mobile Comments at 18; Verizon Comments at 21 (suggesting a deadline of 60 days after the close of the auction).

³⁸¹ While Verizon suggested that the Commission adopt such benchmarks to ensure timely relocation, it did not provide any suggestions for what the benchmarks should be. Verizon Comments at 20-21.

³⁸² *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11100, para. 63. We recognize that secondary users, by their very nature, are on notice that their investments have been made notwithstanding their secondary status in a given band. We emphasize that our decision to apply this framework here is due to the unique circumstances of the 3.3-3.55 GHz band explained herein.

limited number of secondary radiolocation users, the public safety benefit their operations provide to millions of Americans, and the relatively small relocation costs at issue. The Commission's *Emerging Technologies* framework represents a broad set of tools that the Commission uses to facilitate the process of making spectrum available for new uses.³⁸³ Generally, the Commission applies the framework when it is necessary to relocate incumbent licensees in order to introduce new services into a frequency band.³⁸⁴ The application of specific relocation and cost-sharing processes under the framework varies for each frequency band and is based on the types of incumbent licensees and the particular characteristics of the band. In the *FNPRM*, the Commission noted that secondary users are normally not subject to reimbursement because secondary users cannot claim protection from primary operations, including those subsequently licensed by the Commission.³⁸⁵

155. In order to ensure the speedy clearing of the 3.3-3.55 GHz band and minimize disruptions to the weather radar systems operated by secondary radiolocation users, we will require new flexible-use licensees in the 3.45 GHz Service to reimburse secondary, non-federal radiolocation licensees for reasonable costs related to the relocation of those operations to the 2.9-3.0 GHz band, including the costs of a relocation clearinghouse's administration of the reimbursement.³⁸⁶ Several factors lead us to conclude that requiring reimbursement of these secondary, non-federal radiolocation users supports the public interest in this specific instance. First, the operations of secondary radiolocation licensees provide an important public safety service by informing broadcasters' reports on severe, often life-threatening weather events. As NBCUniversal explains, "millions of viewers benefit from often critical and sometimes life-saving weather information that NBCUniversal's [Doppler Weather Radar] sites provide, especially in times of emergency."³⁸⁷ The high-power nature of their radars allows them to cull weather data for large metro areas throughout the country³⁸⁸ and the National Weather Service uses these data to

³⁸³ See *Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands et al.*, WT Docket No. 12-70, Report and Order and Order of Proposed Modification, 27 FCC Rcd 16102, 16207, para. 289 (2012).

³⁸⁴ The Commission provides for the sunset of incumbent licensees and specifies that they may not cause interference to new band entrants. The new entrants then negotiate with incumbents to gain entry into the band and, if necessary, to relocate the incumbents to comparable facilities using alternate spectrum. In many instances, new entrants are negotiating for early access to the band. See, e.g., *3.7 GHz Service Order*, 35 FCC Rcd 2415-21, paras. 178-92; *Improving Public Safety Communications in the 800 MHz Band*; *Consolidating the 800 and 900 MHz Industrial/Land Transportation and Business Pool Channels et al.*, WT Docket No. 02-55, Fifth Report and Order, Eleventh Report and Order, Sixth Report and Order, and Declaratory Ruling, 25 FCC Rcd 13874 (2010); *Amendment of Part 2 of the Commission's Rules to Allocated Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems*, ET Docket No. 00-258, Ninth Report and Order and Order, 21 FCC Rcd 4473, 4479, para. 11 (2006). In this case, however, because the Commission has established a sunset date for incumbents that is soon after the close of the auction, the early access element of the framework does not apply.

³⁸⁵ 47 CFR § 2.104(d)(3).

³⁸⁶ We anticipate clearinghouse costs to be minimal, given the limited number of licensees being relocated and relatively small estimated cost of their transition. The radiolocation service incumbents will initially fund the clearinghouse and can request reimbursement from new flexible-use licensees for the clearinghouse costs.

³⁸⁷ NBCUniversal Comments at 1. See also Nexstar/NBCU Mar. 9, 2021 *Ex Parte* Letter (noting the important public safety value of these operations.)

³⁸⁸ See NBCUniversal Comments at 2 (noting that data from the radar sites is used by NBCUniversal's owned television stations in New York, Dallas-Fort Worth, Chicago, and Miami-Fort Lauderdale to provide weather forecast information to viewers via local news broadcasts and during emergency weather events); see also Nexstar Comments at 2 (noting the importance of its "Max Defender 8" system to weather reporting in Central Florida). The information NBCUniversal's radar operations provide through NBC's local news broadcasts is available to more than 15 million households (and, as NBCUniversal notes, more benefit from the data these stations share with National Weather Service). NBCUniversal Comments at 2.

“enhance its ability to keep the public apprised of the information it needs to remain safe during times of extreme weather.”³⁸⁹ As both NBCUniversal and Nexstar note, their current transmitters and related equipment must be replaced in order for their systems to work in the 2.9-3.0 GHz band; they cannot simply be retuned.³⁹⁰ Given the public interest value served by these Doppler radar networks, and when combined with the limited number of networks at issue, we find that the public interest is served by minimizing any transition-related disruption to these operations.

156. Second, there are very few radiolocation licensees that need to be relocated. In fact, there are only a total of seven³⁹¹ licenses that need to relocate out of the band. Of these seven, four support NBCUniversal’s weather radar system, which in turn informs the weather-related reporting of its owned and operated broadcast networks. One license is held by Nexstar Broadcasting, also to support its weather radar system.³⁹² Compared to other Commission relocation efforts, the number of licensees that need to be moved out of the band here is significantly fewer,³⁹³ and indeed is miniscule compared to the number of flexible-use licenses that will be made available at auction.

157. Third, the overall estimated costs of reimbursement for the weather radar systems to relocate to the 2.9-3.0 GHz band is minimal and we do not believe that it will jeopardize the overall success of the auction of flexible-use licenses. NBCUniversal estimates that it will cost \$2.16 million to relocate all four of its radar systems, inclusive of equipment and labor.³⁹⁴ Nexstar estimates about \$1 million for its systems’ relocation.³⁹⁵ This is a total of just over \$3 million dollars in relocation costs for a band that is expected to generate much more in revenue at auction. Indeed, the record in this proceeding indicates the significant interest in the band, particularly given the importance of 3 GHz spectrum to the rollout of 5G and other next-generation services. We agree with NBCUniversal and Nexstar that “reimbursement is unlikely to have any material impact on investment in the band for flexible use, given the small number of non-federal incumbent Doppler Weather Radar licensees that would be eligible for reimbursement and the correspondingly modest amount required for relocation expenses.”³⁹⁶

158. Fourth, we note that these secondary radiolocation users face relatively minimal limitations from existing federal primary users, which are geographically concentrated in particular locations. As such, the weather radar systems current operate without risk of harmful interference despite their secondary status. Nexstar notes that it does not receive any interference from primary users in its

³⁸⁹ NBCUniversal Comments at 2.

³⁹⁰ *Id.* at 9; Nexstar Comments at 8.

³⁹¹ Since the adoption of the *Report and Order* in this proceeding, the license held by the Town of Warrensburg, New York, has been cancelled at the request of the licensee.

³⁹² The remaining licenses are held by Air-Tel, LLC and IOU Acquisitions, Inc., which are the subject of an enforcement proceeding related to their operations pursuant to these licenses. *See Air-Tel and IOU NAL*. Air-Tel and IOU intentionally altered wireless equipment to operate outside of authorized frequency bands and used their licenses to provide unauthorized wireless data transmission services, not radiolocation services, as authorized by these licenses. Only licensees whose operations are non-federal radiolocation services will be eligible for relocation reimbursement. *See* CTIA Mar. 9, 2021 *Ex Parte* Letter at 3.

³⁹³ *See, e.g., 3.7 GHz Service Order*, 35 FCC Rcd at 2349, para. 11 (explaining that there are 89 fixed service licensees and 66 satellites operating in the C-band subject to relocation, in addition to the “approximately 20,000 registered earth stations in the contiguous United States” (para. 179)); *Incentive Auction Task Force and Media Bureau Report on the Status of the Post-Incentive Auction Transition and Reimbursement Program*, Public Notice, DA 19-68, 34 FCC Rcd 304 (Feb. 11, 2019) (noting that 987 full power and Class A TV stations were assigned to new channels as part of the repack).

³⁹⁴ NBCUniversal Comments at Appx. A.

³⁹⁵ Nexstar Comments at 8-9.

³⁹⁶ NBCUniversal Comments at 1.

location,³⁹⁷ and NBCUniversal notes that its systems “operate without any real-world expectation of harmful interference from other users in the band,” noting that they are more akin to primary users.³⁹⁸

159. For all these reasons, we find that reimbursement of secondary radiolocation users is appropriate in this specific instance. We stress, however, that secondary users generally are not entitled to reimbursement for the expense of transitioning to another band. As a general matter, because such users are not entitled to cause harmful interference to, or seek protection from, primary users, such users have no reasonable expectation that their investments in a band will be reimbursed in a spectrum transition under our *Emerging Technologies* framework. Indeed, absent the presence of all of the unique factors described, we would not mandate reimbursement here. Consistent with the Commission’s longstanding policy, secondary users should not expect that they will be reimbursed as part of a spectrum band clearing.³⁹⁹

3. Cost Allocation Structure

160. We will require that the reasonable relocation reimbursement costs be shared by all 3.45 GHz Service licensees, regardless of location, rather than only those whose licenses would otherwise have been encumbered by the relocating incumbent operations. We find this to be the fairest and most efficient approach given the high-powered nature of many of these radiolocation stations, and the engineering and administrative difficulties inherent in attempting to determine which licensees would be directly affected by their operations. Given the estimated cost of relocation for all secondary, non-federal radiolocation licenses, the burden on each licensee will be small relative to the cost of the license itself. As discussed above, NBCUniversal and Nexstar estimate that their total collective reimbursement costs will be just over \$3 million.⁴⁰⁰ Further, even if not directly affected, all 3.45 GHz Service licensees will benefit from a band fully cleared of secondary, non-federal incumbents. While this basic structure has now become common in our application of the *Emerging Technologies* framework, our application in this instance seeks to streamline reimbursement and minimize the burdens on both incumbents and incoming licensees.

161. All new entrants to the band will be responsible for reimbursement of a *pro rata* share of reasonable relocation costs of non-federal radiolocation operations. In other words, the total relocation costs will be divided by the number of 3.45 GHz Service licenses and each licensee will be required to pay their share based on the number of licenses they hold. If all licenses offered at auction are ultimately issued, this will mean each license held will require payment of approximately 0.025% of the total reimbursement costs.⁴⁰¹

162. We find that this structure provides an efficient and equitable option given the limited number of licensees requiring reimbursement and the complexity in determining which licenses are affected by the high-powered radiolocation systems being relocated. It will ensure that non-federal radiolocation licensees are able to continue their operations without service interruptions while fairly distributing the costs of clearing the band across all new licensees. It also will avoid complex calculations as to which licensees are affected by the non-federal radiolocation operations being relocated. These operations are typically high-powered, which allows them to detect and monitor weather patterns over

³⁹⁷ Nexstar Comments at 5.

³⁹⁸ NBCUniversal Comments at 14.

³⁹⁹ The Commission is not granting “elevated rights” or “squatters rights” to secondary licenses as a result of this decision. CTIA Mar. 9, 2021 *Ex Parte* Letter at 3; Letter from Steve Sharkey, Vice President, Government Affairs, T-Mobile to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348, at 4 (Mar. 8, 2021). As stated, this reimbursement is being granted based on the unique circumstance in this case and in no way creates an expectation of reimbursement for other secondary users.

⁴⁰⁰ NBCUniversal and Nexstar estimate that the total cost of relocation for their 5 licenses will be approximately \$3.2 million. NBCUniversal Comments at Appx. A; Nexstar Comments at 8-9.

⁴⁰¹ This figure is based on ten 10 megahertz licenses available in each of 406 eligible PEAs.

hundreds of miles, but also have the potential to cause harmful interference to wireless broadband operations across several PEAs and not only the one in which they are located. It will therefore speed the process of clearing the band, making it available for deployment as soon after the grant of flexible-use licenses as possible.

163. As the Commission has done in past proceedings, we delegate to the Wireless Telecommunications Bureau, working in coordination with the Office of the Managing Director, authority to develop and implement a clearinghouse selection process similar to the process used in the 3.7 GHz proceeding;⁴⁰² this delegation includes the authority to seek notice and comment on the parameters of additional considerations that should inform the creation and administration of the cost-sharing plan to help implement our decision here and, if necessary for the purposes of the more limited relocation here, to adjust the procedures adopted in that proceeding to tailor them to the relocation in this proceeding. Any disputes as to the reimbursement of particular expenses will be resolved by the Wireless Telecommunications Bureau.

164. 3.45 GHz Service licensees will be required to pay their share of the reimbursement obligations subject to procedures to be specified by public notice. Non-federal secondary radiolocation licensees must submit their expenses for relocating operations authorized under their licenses and existing as of the date of the Commission's temporary freeze on non-federal applications in the 3.3-3.55 GHz band⁴⁰³ subject to procedures to be specified by public notice.

165. Due to the timing of the relocation of secondary, non-federal radiolocation incumbents, we agree with NBCUniversal that the reimbursement requirement should include reasonable expenses incurred before the adoption of this Second Report and Order, provided that such expenses are legitimate, documented, required by the transition, and occurred subsequent to the adoption of the first *Report and Order* in this proceeding.⁴⁰⁴ These expenses include radar components being replaced to accommodate the stations' new frequencies, installation costs, professional services such as engineering to ensure coordination with incumbent operations in the 2.9-3.0 GHz band, and licensing costs related to the new equipment and frequencies.⁴⁰⁵ Expenses for other purposes, however, such as optional equipment upgrades, will not be permitted.⁴⁰⁶ The clearinghouse will have the authority to determine if expenses are eligible for reimbursement, with any disputes to be resolved by the Wireless Telecommunications Bureau.

4. Section 316 License Modification

166. In the *FNPRM*, the Commission proposed to use its section 316 authority to modify existing secondary, non-federal radiolocation licenses such that they are no longer authorized to operate in the 3.3-3.55 GHz band and instead will be authorized for operation in the 2.9-3.0 GHz band.⁴⁰⁷ We adopt this proposal and today issue an Order of Proposed Modification under section 316 to modify these

⁴⁰² *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11101, para. 64-65. See also *Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Systems*, Ninth Report and Order and Order, ET Docket No. 00-258, 21 FCC Rcd 4473, 4518, para. 83 (2006).

⁴⁰³ *Temporary Freeze on Non-Federal Applications in the 3100-3550 MHz Band*, WT Docket No. 19-39, Public Notice, 34 FCC Rcd 19 (WTB Feb. 22, 2019).

⁴⁰⁴ NBCUniversal Comments at 5-6.

⁴⁰⁵ See *id.* at Appendix A.

⁴⁰⁶ See *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Report and Order, 29 FCC Rcd 6567, 6822-23, para. 624 (explaining that entities "may elect to purchase optional equipment capability or make other upgrades at their own cost, but only the cost of the equipment without optional upgrades is a reimbursable expense.").

⁴⁰⁷ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11100, para. 62.

licenses to operate on their new frequencies.⁴⁰⁸ This license modification will allow us to clear the 3.3-3.55 GHz band for flexible-use operations while ensuring that these secondary, non-federal radiolocation operations can continue to offer the same services as they do today. We find that the modification is in the public interest, as it will spur investment in—and deployment of—next-generation wireless services, while ensuring that incumbent space station services will be able to maintain the same services as they are currently providing. We delegate authority to the Wireless Telecommunications Bureau to modify the relevant licenses as needed to specify the new frequencies for each.

H. Continued Operation of Amateur Stations in Part of the 3.3-3.45 GHz Band

167. *Bifurcation of the Amateur Band.*—In the *Report and Order*, the Commission terminated the allocation for secondary amateur operations in the 3.3-3.5 GHz band in order to clear the way for flexible-use operations.⁴⁰⁹ In the *FNPRM*, it proposed to bifurcate the sunset of this allocation in order to allow amateur operations to continue for the time being in that portion of the band not yet ready for commercial operations, while more rapidly clearing the portion necessary to accommodate the new 3.45 GHz Service.⁴¹⁰ This proposal would allow amateur operations to continue in the lower portion of the band while the Commission, NTIA, and the DoD continue to analyze whether that spectrum can be reallocated for flexible use. Specifically, the Commission proposed splitting the band at 3400 MHz, which would allow amateur use in 100 megahertz while also providing a buffer to protect flexible-use operations at the lower edge of the 3.45 GHz band, and it sought comment on this proposal.

168. Commenters generally support allowing amateur use to continue in the lower portion of the band. ARRL notes the ongoing utility of amateur operations and argues that, since the Commission is only licensing new users in the 3.45 GHz band, there is “no reason to remove amateur secondary operations” from the lower portion of the band.⁴¹¹ Commenters are divided, however, on the frequency at which to split the band. 5G Americas supports the Commission’s proposal to include a 50 megahertz guard band to protect flexible-use operations.⁴¹² CTIA similarly supports the Commission’s proposal to allow amateur operations to continue in the 3.3-3.4 GHz band only.⁴¹³ ARRL argues that, contrary to the Commission’s proposal, no guard band is needed to provide for this protection given the low power and low bandwidth nature of amateur operations in this spectrum.⁴¹⁴ ARRL also notes that some amateur equipment is unable to be retuned below 3400 MHz, meaning the 50 megahertz guard band would leave this equipment unusable.⁴¹⁵ T-Mobile also supports amateur operations continuing in the 3.4-3.45 GHz portion of the band.⁴¹⁶ Another commenter proposes that the guard band be reduced to 20 megahertz (splitting the band at 3430 MHz) in order to accommodate real-world equipment usage.⁴¹⁷

169. While we adopt our proposal to bifurcate the band, we adjust our proposal and set 3450 MHz as the frequency at which the band will be split. Based on the record, we find that this best supports the public interest and continued amateur use below the 3.45 GHz band. While the *FNPRM* proposed a

⁴⁰⁸ No commenters object to this proposal, nor did any commenters argue that the replacement spectrum chosen for these operations is insufficient or inadequate for their purposes.

⁴⁰⁹ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11090, para. 33

⁴¹⁰ *Id.* at 11102, para. 69.

⁴¹¹ ARRL Comments at 2.

⁴¹² 5G Americas Comments at 15.

⁴¹³ CTIA Reply at 17-18.

⁴¹⁴ ARRL Comments at 2-3.

⁴¹⁵ *Id.* at 4.

⁴¹⁶ T-Mobile Reply at 5.

⁴¹⁷ Ron Economos Comments.

guard band of 50 megahertz, the record demonstrates that such a guard band is unnecessary given the nature of amateur operations in the band.⁴¹⁸ No commenter provides technical justification for a guard band, and the Commission agrees with the ARRL's assessment that the guard band is not necessary from a technical standpoint. We also recognize that the nature of amateur equipment realities makes the 50 megahertz at 3400-3450 MHz particularly valuable to amateur operators because it means existing equipment can continue to operate in the band for the time being. We therefore allow secondary amateur operations to continue in the 3400-3450 MHz portion of the band. We emphasize, however, that amateur licensees remain secondary users, and those that operate on frequencies close to the 3450 MHz band edge must do so with particular caution to avoid causing harmful interference to flexible-use licensees in the 3.45 GHz Service, which hold primary status. In light of these considerations, while amateur operations between 3450 MHz and 3500 MHz must cease within 90 days of the public notice announcing the close of the auction for the 3.45 GHz Service, as specified in the *Report and Order*, amateur operations may continue between 3300 MHz and 3450 MHz while the Commission, NTIA, and the DoD continue to analyze whether that spectrum can be reallocated for commercial wireless use.

170. We agree with T-Mobile that amateur operators that choose to remain in this band must do so fully aware of the Commission's ongoing efforts to clear the entire 3.1-3.45 GHz band for commercial operations as soon as possible.⁴¹⁹ As the Commission stressed in the *FNPRM*,⁴²⁰ any amateur operations that continue to operate in the 3.3-3.45 GHz band do so on a secondary basis, with the allocation subject to sunset at any time. There is no expectation that such operations will be accommodated in future planning for commercial wireless operations in this spectrum, or that amateur operators will receive more than a short period of notice before their operations must cease.

171. Consistent with our *FNPRM*, we decline to provide reimbursement of "relocation costs" of amateur operations in this band. ARRL suggests that some equipment might be "stranded" if the Commission prohibited continued operations in the 3400-3450 MHz portion of the band and argued reimbursement might be justified if equipment were stranded.⁴²¹ Because we today permit amateur operations to continue on a secondary basis in the 3400-3450 MHz portion of the band, this specific reimbursement issue is moot. More generally, we decline to require 3.45 GHz Service licensees to reimburse amateur users for any potential costs related to their transitions to other amateur bands given the vastly different situation of amateur operators as compared to secondary, non-federal radiolocation operators in the band. As we noted above, requiring reimbursement of secondary users' relocation expenses is itself a departure from Commission precedent; we took this step for secondary, non-federal radiolocation users given the very small number of licensees, the nature of the equipment they use for their high-power weather radar systems, the public safety benefits they provide and the risk to life and property from potential interruption to that service,⁴²² and the relatively minimal costs of relocating these five incumbent systems as compared to the value of this spectrum for flexible-use services. Similar exigent circumstances do not exist here with respect to the hundreds of amateur users in the band, especially given that they have other options available to them within and outside the 3 GHz band.

172. *Section 316 Modification.*—Finally, the *FNPRM* sought comment on whether the Commission must modify amateur licenses pursuant to our section 316 authority in order to accomplish

⁴¹⁸ ARRL Comments at 2-3.

⁴¹⁹ T-Mobile Comments at 19.

⁴²⁰ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11102, para. 69.

⁴²¹ ARRL Comments at 4.

⁴²² While some amateur license holders provide some public safety communications services, *see* ARRL Comments at 3, this is only one of many types of amateur operations and it is not the fundamental nature of the service. *See* 47 CFR § 97.3(a)(4) (defining amateur service as a "radiocommunication service for the purpose of self-training, intercommunication and technical investigations carried out by amateurs, that is, duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest").

our proposed changes to the amateur allocation.⁴²³ No commenters addressed this question. In the *FNPRM*, the Commission noted that, due to the unique nature of amateur licensing, there are no new frequencies being specified for amateur operations; amateurs will instead be permitted to use any frequency already allocated to amateur use. Amateur service operators are granted licenses of a particular class, not a license to operate on particular frequencies.⁴²⁴ Further, because of this bifurcation of the band, amateur operators should require only minimal software changes to their operations, if any changes are required at all. For these reasons, we conclude that the changes to our part 2 and part 97 rules already adopted in this proceeding, along with the part 2 rule changes being adopted today, are sufficient to effectuate this change, and no section 316 license modification is necessary.

IV. ORDER ON RECONSIDERATION

173. In the *Report and Order*, the Commission adopted its proposal from the 2019 *Notice of Proposed Rulemaking* in this proceeding to sunset the secondary amateur allocation in the 3300-3500 MHz band in order to make way for the use of this spectrum for commercial wireless services.⁴²⁵ It noted that clearing all secondary, non-federal operations, including those of amateur operators, will allow the maximum use of the band by flexible-use licensees, and that clearing the entire band, rather than simply the portion being reallocated immediately, will prevent adjacent-channel interference and facilitate future clearing of the entire band for flexible use.⁴²⁶ However, in order to ensure that spectrum continues to be used efficiently, in the *FNPRM* the Commission proposed, and indeed adopted as part of the *Second Report and Order* here, a bifurcated sunset date for that allocation to allow amateur use to continue below 3450 MHz.⁴²⁷

174. ARRL, The National Association for Amateur Radio, seeks reconsideration of the decision in the *Report and Order* to sunset the amateur allocation in order to clear the 3.3-3.5 GHz band. In its petition, ARRL argues that the nature of amateur use is such that it will not cause harmful interference to commercial wireless operations in the 3.45 GHz Service and that the public interest is not served by removing amateur operations from spectrum not being actively considered for commercial wireless use.⁴²⁸ These arguments reiterate points made by ARRL in its original comments in this proceeding.⁴²⁹ CTIA opposes this petition on the grounds that it repeats arguments the Commission previously rejected in the *Report and Order* and that it fails on the merits.⁴³⁰ We agree and deny ARRL's request.⁴³¹

175. Reconsideration “may be appropriate when the petitioner demonstrates that the original order contains a material error or omission, or raises additional facts that were not known or did not exist

⁴²³ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11100, para. 62.

⁴²⁴ *Id.* at 11090, para. 35 (explaining that amateur operators of certain classes may operate in this spectrum, and noting the alternate spectrum available to operators of those classes. Nothing in the *Report and Order* or in this *Second Report and Order* modifies the amateur operator license classes).

⁴²⁵ *Id.* at 11090, para. 33.

⁴²⁶ *Id.* at 11090, para. 34.

⁴²⁷ *Id.* at 11101-02, para. 67.

⁴²⁸ ARRL Petition for Reconsideration, WT Docket No. 19-348 (filed Nov. 9, 2020) at 1-3, 3-7.

⁴²⁹ ARRL Comments at 2-6.

⁴³⁰ CTIA Opposition to Petition for Reconsideration, WT Docket No. 19-348 (filed Dec. 22, 2020). ARRL filed a Reply to CTIA's Opposition to Petition for Reconsideration. See ARRL Reply to Opposition, WT Docket No. 19-348 (filed Jan. 4, 2021) (ARRL Reply).

⁴³¹ 47 CFR § 1.401(e).

until after the petitioner's last opportunity to present such matters."⁴³² Petitions for reconsideration that do not warrant consideration by the Commission include those that: "[f]ail to identify any material error, omission, or reason warranting reconsideration; [r]ely on facts or arguments which have not been previously presented to the Commission; [r]ely on arguments that have been fully considered and rejected by the Commission within the same proceeding;" or "[r]elate to matters outside the scope of the order for which reconsideration is sought[.]"⁴³³

176. We dismiss ARRL's petition as procedurally deficient. The petition fails to identify a material error or omission, raise facts not known before the last opportunity to present such matters, or demonstrate that reconsideration would be in the public interest. Instead, ARRL's petition simply repeats arguments previously raised, considered, and rejected during the initial comment period in this proceeding. CTIA asserts that the petition should be rejected because it "recycles the same arguments that the Commission already considered and rejected in the Order."⁴³⁴ As our rules make clear, the Commission need not consider petitions for reconsideration that "merely repeat arguments we previously . . . rejected."⁴³⁵ Indeed, ARRL's claim that the Commission's "conclusion that amateur operations are incompatible with mobile and fixed services intended to be provided by the new non-federal primary licensees" is conclusory shows that ARRL recognizes that the Commission did address its concerns and reach a conclusion regarding them.⁴³⁶ Simply repeating its assertion that secondary amateur operations can coexist with flexible-use operations, both during deployment and beyond, is not a ground for reconsideration of the Commission's decision in the *Report and Order*.

177. As an alternate and independent basis for our decision, ARRL's petition also fails on the merits. First, ARRL argues that the Commission's decision in the *Report and Order* leaves large amounts of spectrum "vacant." This is not the case. Under the rules adopted here, amateur use will be permitted to continue in the 150 megahertz between 3.3 GHz and 3.45 GHz until the Commission acts to adopt rules permitting commercial wireless use of that part of the band, and flexible-use operations will commence in the spectrum between 3.45-3.55 GHz. All spectrum in which amateur operations are ceasing operation will remain in use, or be available for use at the discretion of federal or non-federal primary users. The entire band will also continue to be used for federal operations. CTIA agrees and states that the Commission has provided users "ample time to relocate because the sunset date will not occur for the upper portion of the 3.3-3.5 GHz band until after the 3.45-3.55 GHz band auction is completed" and amateur use in the lower portion may continue until a future date to be set later in the

⁴³² See *Universal Service Contribution Methodology et al.*, WC Docket No. 06-122 *et al.*, Order on Reconsideration, 27 FCC Rcd 898, 901, para. 8 (2012) (Contribution Methodology Order on Reconsideration); 47 CFR § 1.429(b).

⁴³³ See 47 CFR § 1.429(l)(1)-(3), (5).

⁴³⁴ CTIA Opposition to Petition for Reconsideration at 2, 3-5 (citing *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11090-91, paras. 34, 37). Specifically, CTIA explains that the Commission rejected ARRL's claim that amateur operations should be permitted to continue unless and until an actual potential for interference exists because "[d]oing so would be contrary to the Commission's goal of auctioning spectrum that has been cleared to the greatest extent possible to maximize its utility for flexible use." See *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11090, para. 34. CTIA also asserts that the Commission rejected ARRL's claim that other bands are not sufficient to accommodate those users by explaining that "[a]mateur stations are permitted to operate in many different bands; amateur stations operating in the 3 GHz band have several other nearby bands available to them with similar propagation characteristics." *Id.* at 11091, para. 37.

⁴³⁵ See 47 CFR § 1.429(l); see also *Amendment of Certain of the Commission's Part 1 Rules of Practice and Procedure and Part 0 Rules of Commission Organization*, GC Docket No. 10-44, Report and Order, 26 FCC Rcd 1594, 1606, para. 27 (2011) (reasoning that some petitions for reconsideration "are procedurally defective or merely repeat arguments the Commission previously has rejected, and that policy considerations do not require that the full Commission address such petitions"); CTIA Opposition to Petition for Reconsideration at 2 ("Commission rules and settled law call for dismissal of such repetitive reconsideration petitions.").

⁴³⁶ ARRL Petition at 2.

proceeding.⁴³⁷ As a result of this decision, no spectrum will be left “vacant,” and that which is not actively in use at any particular time has been removed from amateur access in order to provide for full flexibility in use by 3.45 GHz Service licensees.

178. Second, ARRL argues that the Commission’s grounds for rejecting its claims were “conclusory” and “depart[] from its earlier spectrum policy,” such as the *Emerging Technology* framework, because the Commission in the *Emerging Technologies Order* encouraged spectrum sharing and “did not sweep away incumbent users on a date certain as is done in this proceeding.”⁴³⁸ We disagree. While it is true that some band reallocations done under the *Emerging Technologies* framework permitted incumbent operations to continue while new entrants deployed, the *Emerging Technologies* framework represents a broad set of tools that the Commission uses to facilitate the process of making spectrum available for new uses.⁴³⁹ The application of specific relocation and cost-sharing processes under the framework generally varies for each frequency band and is based on the types of incumbent licensees and the particular characteristics of the band. While we agree with ARRL that certain provisions of the *Emerging Technologies Order* were “highly successful in accomplishing the transition to PCS in the 2 GHz bands,” the Commission is required by the Administrative Procedure Act to “provide the essential facts upon which its decisions are based and explanations with actual facts and evidence beyond merely repeating conclusory statements,” as ARRL explains in its Reply.⁴⁴⁰

179. Contrary to ARRL’s claims that the Commission’s reasoning was “conclusory,” ARRL’s proposal to apply certain provisions of the 1993 *Emerging Technologies Order*—without accounting for the differences between the transition to PCS in the 2 GHz band and the 3.45 GHz reallocation—is conclusory and unreasoned. In adopting a new framework for the 3.45 GHz band, the Commission did just that: we considered the technical characteristics of the band, the feasibility of sharing spectrum between incumbent and incoming operations, and the alternate spectrum available to those incumbents. In this case, the rapid deployment of flexible-use operations in this band, and the provision of full flexibility for new wireless broadband deployment, are critical to making the most of the extensive work being done across the federal government to open this band for flexible use. The Commission’s decision to sunset the secondary amateur allocation in the 3.3-3.5 GHz band in order to make way for the use of this spectrum for flexible-use wireless services and to adopt a bifurcated sunset date to allow amateur use to continue below 3450 MHz is supported by the unique circumstances and particular characteristics of the band.

180. Further, as noted in the *Report and Order*, amateur operators have alternate spectrum, including in the 3 GHz band, in which to conduct their operations without creating interference concerns and notification requirements for flexible-use wireless licensees. CTIA agrees with the Commission’s reasoning that requires amateur operators to relocate by a sunset date, stating that this approach is “entirely reasonable because amateur operators can move to myriad other bands that have an amateur allocation.”⁴⁴¹ As the Commission explained in the *Report and Order*, the record strongly favored a full clearing of the band before the grant of new flexible-use licenses in order to avoid reducing the deployment flexibility of new flexible-use licensees.⁴⁴² This is due to the different nature of flexible-use

⁴³⁷ CTIA Opposition to Petition for Reconsideration at 2, 9-10.

⁴³⁸ ARRL Reply at 2-4.

⁴³⁹ See *Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands et al.*, WT Docket No. 12-70, Report and Order and Order of Proposed Modification, 27 FCC Rcd 16102, 16207, para. 289 (2012).

⁴⁴⁰ See ARRL Reply at 3.

⁴⁴¹ CTIA Opposition to Petition for Reconsideration at 2, 9 (arguing that the Commission “soundly concluded that amateur users have many options for spectrum that is most suitable for the services they provide”).

⁴⁴² *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11087-88, para. 24.

operations relative to federal radiolocation operations, and the different spectrum available for secondary use with the change in primary user of this band.⁴⁴³ With respect to this band, the Commission in the *Report and Order* found, and we affirm here, that allowing amateur operations to continue until each individual frequency is put in use by a new 3.45 GHz Service licensee in that specific location would place an unnecessary burden on new licensees to ascertain the location and nature of amateur operations and provide proper notice to them. The Commission agreed with the concerns about burdens on licensees created by ARRL's proposal and believed that relying on amateurs to design their systems so as not to interfere with commercial operations would unreasonably restrain the flexibility commercial wireless licensees expect when spectrum rights are awarded at auction and is not in the public interest. Allowing maximal flexibility in network design, deployment, and operation "will increase investment in communications services and systems and technological development by providing maximum opportunities for deployment of flexible-use services."⁴⁴⁴ We find that ARRL has offered nothing in its petition to rebut the Commission's conclusions.

181. In an *ex parte* filed following the public release of the draft of this item, ARRL argues again that there is "no justification" offered for the Commission's position.⁴⁴⁵ But even in that filing, ARRL acknowledges that its proposal for continued secondary access would impose burdens on 3.45 GHz Service licensees. In particular, before deploying pursuant to its license, a new 3.45 GHz licensee would be required to perform a "spectrum survey" combined with notice to amateurs in an area of proposed service, or to work with ARRL and issue a public notification of its build-out plans.⁴⁴⁶ This structure is, by definition, a restriction on licensee flexibility in deployment and a burden imposed on primary licensees in order to enable secondary access. We do not believe that continued access to this spectrum for amateur operations justifies these limitations on the use of the band by 3.45 GHz Service licensees, especially given continued amateur access to 100 megahertz of this band.

182. ARRL argues that alternative spectrum may not be suitable for several specific amateur uses, including propagation studies and related weak signal and moon bounce operations, "since by their nature they are dependent upon and studying the particular properties of the 3.3-3.5 GHz spectrum."⁴⁴⁷ As the Commission made clear in the *Report and Order*, amateur stations operating in the 3 GHz band have several other nearby bands available to them with similar propagation characteristics.⁴⁴⁸ ARRL notes in its reply that some amateur uses cannot be replicated in the numerous other spectrum bands available for amateur operations; to the extent that this is true, it is nonetheless outweighed by benefits of full clearing of this spectrum—ensuring that the spectrum is used intensely and efficiently, creating a spectral environment that will support wireless broadband operations, and promoting commercial interest and investment in the band.

183. The Commission made clear in the *Report and Order* that the full clearing of spectrum is necessary to ensure the intensive and efficient use of spectrum, create a spectral environment that will

⁴⁴³ See CTIA 2019 Reply at 6-9 (urging the Commission to make clearing the band "its top priority" due to interference concerns); Open Technology Institute 2019 Reply at 7-8 (agreeing with the "clear consensus" that full removal of non-federal incumbents is a prerequisite to flexible-use operations); T-Mobile 2019 Reply at 4-7 (opposing continued access for secondary incumbent operations after licensing for flexible use).

⁴⁴⁴ *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11088, para. 25.

⁴⁴⁵ See Letter from David Sindall, Washington Counsel for ARRL to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 at 3-5 (Mar. 10, 2021) (ARRL Mar. 10, 2021 *Ex Parte* Letter).

⁴⁴⁶ *Id.* at 3.

⁴⁴⁷ ARRL Reply at 6.

⁴⁴⁸ See *3.1-3.55 GHz R&O and FNPRM*, 35 FCC Rcd at 11090, para. 34.

support wireless broadband operations, and promote commercial interest and investment in the band.”⁴⁴⁹ ARRL has provided no new argument as to why this decision is incorrect or not in the public interest, and we therefore deny its petition for reconsideration.

184. In a recent *ex parte*, ARRL asks that amateur use be permitted to continue in Alaska, Hawaii, and U.S. territories.⁴⁵⁰ We deny this additional request. The marginal benefits of allowing a temporary continuation of secondary amateur operations outside the contiguous United States is outweighed by the public interest benefits of removing this potential hurdle to future flexible use licensing in Alaska, Hawaii, and U.S. territories. Clearing secondary amateur operations from these areas today will simplify and hasten the process of introducing flexible-use licensing in these areas in the future, in line with the Commission’s other decisions in this proceeding and with the Congressional direction to make the licenses available for flexible use expeditiously.⁴⁵¹

V. PROCEDURAL MATTERS

185. *Ex Parte Presentations.* The proceeding shall be treated as a “permit-but-disclose” proceeding in accordance with the Commission’s *ex parte* rules. 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.

186. *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 protest of the proposed modifications no later than thirty (30) days after publication of this *Report and Order* in the Federal Register. Protests may be filed using the Commission’s Electronic Comment Filing System (ECFS). *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- Electronic filers: Comments may be filed electronically using the Internet by accessing the ECFS: <http://apps.fcc.gov/ecfs/>.
- Paper filers: Parties who choose to file by paper must file an original and one copy of each filing.
- All filings must be addressed to the Commission’s Secretary, Office of the Secretary, Federal Communications Commission.

⁴⁴⁹ CTIA agrees that these decisions are within the Commission’s authority and firmly supported by the record. CTIA Opposition to Petition for Reconsideration at 4-8.

⁴⁵⁰ ARRL Mar. 10, 2021 *Ex Parte* Letter at 3.

⁴⁵¹ *See* Beat CHINA for 5G Act of 2020.

- 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 45 L St NE, Washington, DC 20554.
- Effective March 19, 2020, and until further notice, the Commission no longer accepts any hand or messenger delivered filings. This is a temporary measure taken to help protect the health and safety of individuals, and to mitigate the transmission of COVID-19. *See FCC Announces Closure of FCC Headquarters Open Window and Change in Hand-Delivery Policy*, Public Notice, DA 20-304 (March 19, 2020), <https://www.fcc.gov/document/fcc-closes-headquarters-open-window-and-changes-hand-delivery-policy>.
 - During the time the Commission’s building is closed to the general public and until further notice, if more than one docket or rulemaking number appears in the caption of a proceeding, paper filers need not submit two additional copies for each additional docket or rulemaking number; an original and one copy are sufficient.
 - After COVID-19 restrictions are lifted, the Commission has established that hand-carried documents are to be filed at the Commission’s office located at 9050 Junction Drive, Annapolis Junction, MD 20701. This will be the only location where hand-carried paper filings for the Commission will be accepted.⁴⁵²

187. *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).

188. *Regulatory Flexibility Act.* The Regulatory Flexibility Act of 1980, as amended (RFA), requires that an agency prepare a regulatory flexibility analysis for notice and comment rulemakings, unless the agency certifies that “the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities.” Accordingly, we have prepared a Final Regulatory Flexibility Analysis (FRFA) concerning the potential impact of rule and policy changes adopted in the Report and Order on small entities. The FRFA is set forth in Appendix B.

189. *Paperwork Reduction Act Analysis.* This *Report and Order* contains new or modified information collection requirements subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. Further, it does not contain any new or modified information collection burden for small business concerns with fewer than 25 employees, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, *see* 44 U.S.C. § 3506(c)(4).

190. *Congressional Review Act.* The Commission has determined, and the Administrator of the Office of Information and Regulatory Affairs, Office of Management and Budget, concurs that these rules are “major” under the Congressional Review Act, 5 U.S.C. § 804(2). The Commission will send a copy of this Second Report and Order, Order on Reconsideration, and Order of Proposed Modification to Congress and the Government Accountability Office pursuant to 5 U.S.C. § 801(a)(1)(A).

191. *Further Information.* For additional information on this proceeding, contact Joyce Jones of the Mobility Division, Wireless Telecommunication Bureau, at joyce.jones@fcc.gov or (202) 418-1327 or Ira Keltz of the Office of Engineering and Technology, at ira.keltz@fcc.gov or (202) 418-0616.

⁴⁵² *See Amendment of the Commission’s Rules of Practice and Procedure*, Order, DA 20-562 (OMD 2020).

VI. ORDERING CLAUSES

192. IT IS ORDERED, pursuant to sections 1, 4(i), 157, 301, 303, 307, 308, 309, 310, 316, of the Communications Act of 1934, as amended, as well as the Commercial Spectrum Enhancement Act, Pub. L. 108-494, 118 Stat. 3986 (Dec. 23, 2004) as amended, and the MOBILE NOW Act, Pub. L. 115-141, 132 Stat. 1098, Div. P, Title VI, § 603 (Mar. 23, 2018), 47 U.S.C. §§ 151, 154(i), 157, 301, 303, 307, 308, 309, 310, 316, 923(g), and 928 and 1502, and by the Beat China by Harnessing Important, National Airwaves for 5G Act of 2020, Pub. L. 116-260, Division FF, Title IX, Sec. 905 that this Second Report and Order, Order on Reconsideration, and Order of Proposed Modification IS ADOPTED.

193. IT IS FURTHER ORDERED that the rules and requirements as adopted herein ARE ADOPTED, effective sixty (60) days after publication in the Federal Register; and that the Order of Proposed Modification is effective as of the date of publication in the Federal Register; provided however, that sections 2.106, 27.14, 27.1603, 27.1605, and 27.1607 of the Commission's rules, which contain new or modified information collection requirements that require review by the Office of Management and Budget (OMB) under the Paperwork Reduction Act, will not become effective until the effective date for those information collections is announced in a document published in the Federal Register after the Commission receives OMB approval. The Commission delegates authority to the Wireless Telecommunications Bureau to issue such document and to cause sections 2.106, 27.14, 27.1603, 27.1605, and 27.1607 to be revised accordingly.

194. IT IS FURTHER ORDERED that, pursuant to Sections 309 and 316 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 309 and 316, in the Order of Proposed Modification the Commission proposes that the licenses and authorizations of all secondary, non-federal radiolocation licenses in the 3.3-3.55 GHz band will be modified pursuant to the conditions specified in this Second Report and Order at paragraph 166. These modification conditions will be effective 60 days after publication of this Second Report and Order, Order on Reconsideration, and Order of Proposed Modification in the Federal Register, provided, however, that in the event any secondary, non-federal radiolocation licensee who believes that its license or permit would be modified by this proposed action, seeks to protest this proposed modification pursuant to the procedures above, the proposed license modifications specified in this Second Report and Order, Order on Reconsideration, and Order of Proposed Modification and contested by the licensee shall not be made final as to such licensee unless and until the Commission orders otherwise. Pursuant to section 316(a)(1) of the Communications Act of 1934, as amended, 47 U.S.C. § 316(a)(1), publication of this Second Report and Order in the Federal Register shall constitute notification in writing of our Order proposing the modification of the secondary, non-federal radiolocation licenses, and of the grounds and reasons therefore, and those licenses and any other party seeking to file a protest pursuant to section 316 shall have 30 days from the date of such publication to protest such Order.

195. IT IS FURTHER ORDERED that, pursuant to sections 309 and 316 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 309 and 316, that following the final modification of each secondary, non-federal radiolocation license, the Wireless Telecommunications Bureau shall modify each such license as necessary in order to provide for its new frequency assignment.

196. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this Second Report and Order, Order on Reconsideration and Order of Proposed Modification including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

Final Rules

The Federal Communications Commission amends 47 CFR parts 1, 2, and 27 as follows:

PART 1 – PRACTICE AND PROCEDURE

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

AUTHORITY: [TO BE INSERTED PRIOR TO PUBLICATION OF SUMMARY IN FEDERAL REGISTER.].

2. Amend § 1.907 by revising the definition of “Covered geographic licenses” to read as follows:

§ 1.907 Definitions.

* * * * *

Covered geographic licenses. Covered geographic licenses consist of the following services: 1.4 GHz Service (part 27, subpart I of this chapter); 1.6 GHz Service (part 27, subpart J); 24 GHz Service and Digital Electronic Message Services (part 101, subpart G of this chapter); 218-219 MHz Service (part 95, subpart F, of this chapter); 220-222 MHz Service, excluding public safety licenses (part 90, subpart T, of this chapter); 600 MHz Service (part 27, subpart N); 700 MHz Commercial Services (part 27, subparts F and H); 700 MHz Guard Band Service (part 27, subpart G); 800 MHz Specialized Mobile Radio Service (part 90, subpart S); 900 MHz Specialized Mobile Radio Service (part 90, subpart S); 900 MHz Broadband Service (part 27, subpart P); 3.45 GHz Service (part 27, subpart Q); 3.7 GHz Service (part 27, subpart O); Advanced Wireless Services (part 27, subparts K and L); Air-Ground Radiotelephone Service (Commercial Aviation) (part 22, subpart G, of this chapter); Broadband Personal Communications Service (part 24, subpart E, of this chapter); Broadband Radio Service (part 27, subpart M); Cellular Radiotelephone Service (part 22, subpart H); Citizens Broadband Radio Service (part 96, subpart C, of this chapter); Dedicated Short Range Communications Service, excluding public safety licenses (part 90, subpart M); Educational Broadband Service (part 27, subpart M); H Block Service (part 27, subpart K); Local Multipoint Distribution Service (part 101, subpart L); Multichannel Video Distribution and Data Service (part 101, subpart P); Multilateration Location and Monitoring Service (part 90, subpart M); Multiple Address Systems (EAs) (part 101, subpart O); Narrowband Personal Communications Service (part 24, subpart D); Paging and Radiotelephone Service (part 22, subpart E; part 90, subpart P); VHF Public Coast Stations, including Automated Maritime Telecommunications Systems (part 80, subpart J, of this chapter); Upper Microwave Flexible Use Service (part 30 of this chapter); and Wireless Communications Service (part 27, subpart D of this chapter).

* * * * *

3. Amend § 1.9005 by
 - a. Removing the word “and” at the end of paragraph (ll);
 - b. Removing the period at the end of paragraph (mm) and adding a semi-colon;
 - c. Removing the period at the end of the paragraph (nn) and adding a semi-colon;
 - d. Removing the period at the end of paragraph (oo) and adding and “; and” in its place; and
 - e. Adding paragraph (pp).

The addition reads as follows:

§ 1.9005 Included services.

* * * * *

(pp) The 3.45 GHz Service in the 3.45-3.55 GHz band (part 27 of this chapter).

PART 2 – FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

4. The authority citation for part 2 continues to read as follows:

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

5. Amend § 2.106, the Table of Frequency Allocations, by:

- a. Revising pages 40 and 41; and
- b. In the list of United States (US) Footnotes:
 - i. Add footnotes US103 and US431B; and
 - ii. Revise footnote US108.

The revisions and additions read as follows:

§ 2.106 Table of Frequency Allocations.

* * * * *

2670-2690 FIXED 5.410 MOBILE except aeronautical mobile 5.384A Earth exploration-satellite (passive) Radio astronomy Space research (passive)	2670-2690 FIXED 5.410 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) 5.208B 5.415 MOBILE except aeronautical mobile 5.384A Earth exploration-satellite (passive) Radio astronomy Space research (passive)	2670-2690 FIXED 5.410 FIXED-SATELLITE (Earth-to-space) 5.415 MOBILE except aeronautical mobile 5.384A MOBILE-SATELLITE (Earth-to-space) 5.351A 5.419 Earth exploration-satellite (passive) Radio astronomy Space research (passive)			
5.149 5.412	5.149	5.149	US205	US385	
2690-2700 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive)			2690-2700 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive)		
5.340 5.422			US246		
2700-2900 AERONAUTICAL RADIONAVIGATION 5.337 Radiolocation			2700-2900 METEOROLOGICAL AIDS AERONAUTICAL RADIONAVIGATION 5.337 US18 Radiolocation G2	2700-2900	Aviation (87)
5.423 5.424			5.423 G15	5.423 US18	
2900-3100 RADIOLOCATION 5.424A RADIONAVIGATION 5.426			2900-3100 RADIOLOCATION 5.424A G56 MARITIME RADIONAVIGATION	2900-3100 MARITIME RADIONAVIGATION Radiolocation US44	Maritime (80) Private Land Mobile (90)
5.425 5.427			5.427 US44 US316	5.427 US316	
3100-3300 RADIOLOCATION Earth exploration-satellite (active) Space research (active)			3100-3300 RADIOLOCATION G59 Earth exploration-satellite (active) Space research (active)	3100-3300 Earth exploration-satellite (active) Space research (active) Radiolocation	Private Land Mobile (90)
5.149 5.428			US342	US342	
3300-3400 RADIOLOCATION	3300-3400 RADIOLOCATION Amateur Fixed Mobile	3300-3400 RADIOLOCATION Amateur	3300-3500 RADIOLOCATION G2	3300-3450	
5.149 5.429 5.429A 5.429B 5.430	5.149 5.429C 5.429D	5.149 5.429 5.429E 5.429F			
3400-3600 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.430A Radiolocation	3400-3500 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.431A 5.431B Amateur Radiolocation 5.433 5.282	3400-3500 FIXED FIXED-SATELLITE (space-to-Earth) Amateur Mobile 5.432 5.432B Radiolocation 5.433 5.282 5.432A	US103 US108 US342 US431B	US103 US108 US342 3450-3600 FIXED MOBILE except aeronautical mobile	Wireless Communications (27) Citizens Broadband (96)
5.341				US103 US105 US108 US433 US431B	

Table of Frequency Allocations			3500-5460 MHz (SHF)		Page 41
International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
3400-3600 MHz: see previous page	3500-3600 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.431B Radiolocation 5.433	3500-3600 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.433A Radiolocation 5.433	3500-3550 RADIOLOCATION G59 AERONAUTICAL RADIONAVIGATION (ground-based) G110 US103 US108 US431B	3450-3600 MHz: see previous page	
3600-4200 FIXED FIXED-SATELLITE (space-to-Earth) Mobile	3600-3700 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.434 Radiolocation 5.433	3600-3700 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation 5.435	3550-3650 RADIOLOCATION G59 AERONAUTICAL RADIONAVIGATION (ground-based) G110	3600-3650 FIXED FIXED-SATELLITE (space-to-Earth) US107 US245 MOBILE except aeronautical mobile US105 US433	Satellite Communications (25) Citizens Broadband (96)
			US105 US107 US245 US433	3650-3700 FIXED FIXED-SATELLITE (space-to-Earth) NG169 NG185 MOBILE except aeronautical mobile US109 US349	
			US109 US349	3700-4000 FIXED MOBILE except aeronautical mobile NG182 NG457A	
4200-4400 AERONAUTICAL MOBILE (R) 5.436 AERONAUTICAL RADIONAVIGATION 5.438 5.437 5.439 5.440	3700-4200 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile		3700-4200	4000-4200 FIXED FIXED-SATELLITE (space-to-Earth) NG457A NG182	Satellite Communications (25)
			4200-4400 AERONAUTICAL RADIONAVIGATION		Aviation (87)
			4400-4500 FIXED MOBILE 5.440A	4400-4500	
4500-4800 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 MOBILE 5.440A	4800-4990 FIXED MOBILE 5.440A 5.441A 5.441B 5.442 Radio astronomy 5.149 5.339 5.443		4400-4940 FIXED MOBILE	4500-4800 FIXED-SATELLITE (space-to-Earth) 5.441 US245	
4800-4940 US113 US245 US342			4800-4940 US113 US342		
4940-4990 5.339 US342 US385 G122			4940-4990 FIXED MOBILE except aeronautical mobile 5.339 US342 US385	Public Safety Land Mobile (90Y)	
4990-5000 FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY Space research (passive) 5.149			4990-5000 RADIO ASTRONOMY US74 Space research (passive) US246		

* * * * *

UNITED STATES (US) FOOTNOTES

* * * * *

US103 In the band 3300-3550 MHz, non-Federal stations in the radiolocation service that were licensed (or licensed pursuant to applications accepted for filing) before February 22, 2019 may continue to operate on a secondary basis until 180 days after the issuance of the first flexible-use licenses in the 3.45 GHz Service. No new assignments shall be made. In the band 3300-3500 MHz, stations in the amateur service may continue to operate on a secondary basis until new flexible-use licenses are issued for operation in the band in which they operate. Amateur operations between 3450 MHz and 3500 MHz must cease within 90 days of the public notice announcing the close of the auction for the 3.45 GHz Service. Stations in the amateur service may continue to operate in the band 3300-3450 MHz on a secondary basis while the band's future uses are finalized, but stations in the amateur service may be required to cease operations in the band 3300-3450 MHz at any time if the amateur service causes harmful interference to flexible-use operations.

* * * * *

US108 In the band 10-10.5 GHz, survey operations, using transmitters with a peak power not to exceed five watts into the antenna, may be authorized for Federal and non-Federal use on a secondary basis to other Federal radiolocation operations.

* * * * *

US431B The band 3450-3550 MHz is allocated on a primary basis to the Federal radiolocation service and to the non-Federal fixed and mobile, except aeronautical mobile, services on a nationwide basis. Federal operations in the band 3450-3550 MHz shall not cause harmful interference to non-Federal operations, except under the following circumstances.

(a) *Cooperative Planning Areas.* Cooperative Planning Areas (CPAs) are geographic locations in which non-Federal operations shall coordinate with Federal systems in the band to deploy non-Federal operations in a manner that shall not cause harmful interference to Federal systems operating in the band. In addition, operators of non-Federal stations may be required to modify their operations (*e.g.*, reduce power, filtering, adjust antenna pointing angles, shielding, *etc.*) to protect Federal operations against harmful interference and to avoid, where possible, interference and potential damage to the non-Federal operators' systems. In these areas, non-Federal operations may not claim interference protection from Federal systems. Federal and non-Federal operators may reach mutually acceptable operator-to-operator agreements to permit more extensive non-Federal use by identifying and mutually agreeing upon a technical approach that mitigates the interference risk to Federal operations. To the extent possible, Federal use in CPAs will be chosen to minimize operational impact on non-Federal users. The table in paragraph (d) identifies the locations of CPAs, including, for information, those with high powered Federal operations. CPAs may also be Periodic Use Areas as described below. Coordination between Federal users and non-Federal licensees in CPAs shall be consistent with rules and procedures established by the FCC and NTIA.

(b) *Periodic Use Areas.* Periodic Use Areas (PUAs) are geographic locations in which non-Federal operations in the band shall not cause harmful interference to Federal systems operating in the band for episodic periods. During these times and in these areas, Federal users will require interference protection from non-Federal operations. Operators of non-Federal stations may be required to temporarily modify their operations (*e.g.*, reduce power, filtering, adjust antenna pointing angles, shielding, *etc.*) to protect Federal operations from harmful interference, which may include restrictions on non-Federal stations' ability to radiate at certain locations during specific periods of time. During such episodic use, non-Federal users in PUAs must alter their operations to avoid harmful interference to Federal systems' temporary use of the band, and during such times, non-Federal operations may not claim interference protection from Federal systems. Federal and non-Federal operators may reach mutually acceptable

operator-to-operator agreements such that a Federal operator may not need to activate a PUA if a mutually agreeable technical approach mitigates the interference risk to Federal operations. To the extent possible, Federal use in PUAs will be chosen to minimize operational impact on non-Federal users. Coordination between Federal users and non-Federal licensees in PUAs shall be consistent with rules and procedures established by the FCC and NTIA. While all PUAs are co-located with CPAs, the exact geographic area used during periodic use may differ from the co-located CPA. The geographic locations of PUAs are identified in the table in paragraph (d). Restrictions and authorizations for the CPAs remain in effect during periodic use unless specifically relieved in the coordination process.

(c) For the CPA at Little Rock, AR, after approximately 12 months from the close of the auction, non-Federal operations shall coordinate with Federal systems in only the 3450-3490 MHz band segment and the 3490-3550 MHz band segment will be available for non-federal use without coordination. At Fort Bragg, NC, non-Federal operations shall coordinate with Federal systems in only the 3450-3490 MHz band segment.

(d) The following table identifies the coordinates for the location of each CPA and PUA. An area may be represented as either a polygon made up of several corresponding coordinates or a circle represented by a center point and a radius. If a CPA has a corresponding PUA, the PUA coordinates are provided. A location marked with an asterisk (*) indicates a high-power federal radiolocation facility. If a location includes a Shipboard Electronic Systems Evaluation Facility (SESEF) attached to a homeport, it specifies the associated SESEF.

Table: Department of Defense Cooperative Planning Areas and Periodic Use Areas

Location name	State	CPA	PUA	Latitude	Longitude	Radius (km)
Little Rock	AR	Yes	-	37° 28' 34" 37° 42' 55" 36° 38' 29" 34° 57' 57" 32° 09' 36" 31° 51' 52" 32° 12' 11" 33° 42' 22" 35° 17' 35" 36° 12' 18"	94° 28' 24" 88° 54' 36" 87° 52' 34" 88° 09' 26" 92° 06' 54" 93° 10' 35" 94° 37' 07" 95° 49' 52" 96° 23' 06" 96° 08' 46"	N/A
Yuma Complex (includes Yuma Proving Grounds and MCAS Yuma)	AZ	Yes	Yes	33° 36' 44" 34° 03' 08" 34° 03' 56" 33° 26' 54" 32° 51' 17" 32° 16' 54" 32° 14' 39" 32° 20' 06" 32° 28' 30" 32° 53' 20"	115° 10' 44" 114° 41' 08" 114° 05' 56" 113° 03' 54" 113° 02' 17" 113° 45' 54" 114° 40' 39" 114° 55' 06" 115° 02' 30" 115° 09' 20"	N/A
Camp Pendleton	CA	Yes	-	33° 21' 46"	117° 25' 25"	50

Location name	State	CPA	PUA	Latitude	Longitude	Radius (km)
Edwards Air Force Base	CA	Yes	Yes	35° 19' 16" 35° 17' 54" 35° 11' 43" 35° 00' 52" 34° 44' 17" 34° 34' 16" 34° 26' 55" 34° 28' 59" 34° 41' 36" 35° 07' 32"	118° 03' 16" 117° 26' 54" 117° 15' 43" 117° 10' 52" 117° 10' 17" 117° 19' 16" 117° 47' 55" 118° 16' 59" 118° 28' 36" 118° 25' 32"	N/A
National Training Center	CA	Yes	Yes	36° 03' 31" 36° 03' 09" 35° 41' 46" 35° 07' 24" 34° 42' 43" 34° 44' 22" 35° 02' 28" 35° 34' 49"	117° 00' 45" 116° 20' 43" 115° 44' 31" 115° 44' 09" 116° 17' 58" 117° 05' 19" 117° 35' 18" 117° 27' 37"	N/A
Naval Air Weapons Station, China Lake*	CA	Yes	Yes	36° 36' 42" 35° 54' 45" 35° 00' 01" 34° 54' 34" 35° 44' 22" 36° 30' 18"	117° 20' 42" 116° 31' 45" 116° 39' 01" 117° 26' 34" 118° 17' 22" 118° 07' 18"	N/A
Point Mugu	CA	Yes	Yes	34° 06' 44"	119° 06' 36"	38
San Diego* (includes Point Loma SESEF range)	CA	Yes	-	33° 4' 10" 32° 27' 19" 32° 33' 29" 32° 47' 16" 33° 1' 20" 33° 20' 36" 33° 24' 36" 32° 52' 54" 33° 04' 10"	117° 35' 40" 118° 0' 37" 116° 51' 8" 116° 28' 5" 116° 31' 5" 116° 47' 10" 117° 0' 51" 117° 9' 35" 117° 35' 40"	N/A
Twentynine Palms	CA	Yes	-	34° 06' 44"	116° 06' 36"	75
Eglin Air Force Base (includes Santa Rosa Island & Cape San Blas site)	FL	Yes	Yes	Eglin and Santa Rosa Island: 30° 29' 28.5" Cape San Blas: 29° 40' 37"	Eglin and Santa Rosa Island: 86° 45' 00" Cape San Blas: 85° 20' 50"	35
Mayport* (includes Mayport SESEF range)	FL	Yes	-	30° 23' 42"	81° 24' 41"	64
Pensacola*	FL	Yes	Yes	30° 20' 50"	87° 18' 40"	93

Location name	State	CPA	PUA	Latitude	Longitude	Radius (km)
Joint Readiness Training Center	LA	Yes	Yes	31° 54' 23" 31° 50' 54" 31° 18' 13" 30° 46' 33" 30° 29' 14" 30° 46' 22" 31° 25' 16"	93° 20' 53" 92° 52' 46" 92° 26' 31" 92° 28' 32" 93° 4' 1" 93° 41' 26" 94° 3' 19"	N/A
Chesapeake Beach*	MD	Yes	Yes	38° 39' 24"	76° 31' 41"	95
Naval Air Station, Patuxent River	MD	Yes	Yes	38° 26' 22" 38° 51' 51" 38° 28' 11" 38° 03' 40" 37° 45' 33" 37° 34' 34" 37° 38' 10" 38° 09' 32" 38° 18' 46" 38° 26' 59"	76° 14' 12" 75° 48' 34" 75° 28' 53" 75° 30' 31" 75° 45' 50" 76° 20' 09" 76° 44' 37" 76° 29' 28" 76° 34' 36" 76° 26' 27"	N/A
CPA						
PUA				38° 33' 38" 39° 11' 10" 38° 38' 51" 37° 52' 13" 37° 29' 44" 37° 10' 24" 37° 20' 05" 38° 01' 11" 38° 20' 54" 38° 35' 47"	76° 07' 29" 75° 29' 28" 75° 00' 40" 75° 03' 24" 75° 22' 25" 76° 16' 42" 77° 06' 52" 76° 36' 06" 76° 46' 41" 76° 30' 02"	
St. Inigoes*	MD	Yes	Yes	38° 08' 41"	76° 26' 03"	87
Bath*	ME	Yes	Yes	44° 02' 29" 43° 52' 27" 43° 48' 53" 43° 32' 50" 43° 27' 16" 43° 44' 26" 43° 54' 57" 44° 06' 56" 44° 17' 2" 44° 26' 54" 44° 36' 16" 44° 33' 45" 44° 57' 05" 44° 56' 27" 44° 32' 13" 44° 24' 08" 44° 02' 29"	70° 10' 41" 70° 10' 29" 70° 01' 6" 69° 57' 30" 69° 42' 52" 69° 13' 52" 69° 24' 50" 69° 25' 13" 69° 16' 56" 69° 45' 13" 69° 56' 50" 70° 04' 01" 70° 14' 55" 70° 19' 38" 70° 08' 17" 70° 36' 36" 70° 10' 41"	N/A
Pascagoula*	MS	Yes	Yes	30° 20' 42"	88° 34' 17"	80
Camp Lejeune	NC	Yes	-	34° 37' 51"	77° 24' 28"	54

Location name	State	CPA	PUA	Latitude	Longitude	Radius (km)
Cherry Point	NC	Yes	-	34° 54' 57"	76° 53' 24"	38
Fort Bragg	NC	Yes	-	37° 35' 01" 37° 45' 56" 37° 22' 33" 36° 38' 56" 34° 43' 13" 33° 29' 44" 33° 24' 04" 34° 01' 05" 35° 27' 24" 36° 27' 46"	79° 31' 19" 77° 14' 14" 76° 18' 30" 75° 51' 26" 76° 15' 37" 78° 29' 53" 80° 29' 07" 81° 23' 49" 81° 37' 00" 81° 22' 49"	N/A
Portsmouth*	NH	Yes	Yes	42° 23' 06" 42° 25' 05" 42° 21' 36" 42° 18' 28" 42° 13' 01" 42° 06' 30" 42° 02' 54" 42° 08' 03" 42° 10' 25" 42° 15' 39" 42° 22' 44" 42° 34' 56" 42° 52' 26" 43° 13' 48" 43° 31' 21" 43° 45' 21" 43° 59' 20" 43° 36' 10" 43° 49' 27" 43° 27' 40" 43° 00' 57" 42° 44' 40" 42° 51' 47" 42° 33' 46" 42° 24' 24" 42° 23' 06"	71° 10' 23" 71° 05' 43" 71° 00' 54" 70° 54' 35" 70° 44' 53" 70° 41' 11" 70° 37' 44" 70° 33' 35" 70° 20' 54" 70° 02' 39" 69° 48' 42" 69° 36' 01" 69° 26' 24" 69° 28' 18" 69° 40' 13" 70° 01' 31" 70° 30' 21" 70° 52' 5" 71° 15' 22" 71° 24' 47" 71° 53' 01" 71° 56' 37" 71° 27' 07" 71° 27' 12" 71° 21' 10" 71° 10' 23"	N/A

Location name	State	CPA	PUA	Latitude	Longitude	Radius (km)
Moorestown*	NJ	Yes	Yes	40° 27' 26" 40° 02' 54" 39° 48' 19" 39° 38' 27" 39° 24' 59" 39° 17' 18" 39° 22' 16" 39° 29' 35" 39° 54' 43" 40° 15' 03" 40° 23' 29" 40° 42' 46" 40° 50' 59" 40° 52' 49" 40° 47' 42" 40° 33' 25" 40° 27' 26"	75° 42' 60" 75° 55' 12" 75° 55' 55" 75° 51' 48" 75° 21' 41" 74° 54' 09" 74° 27' 56" 74° 12' 59" 74° 00' 05" 74° 06' 20" 74° 08' 28" 74° 21' 54" 74° 31' 36" 74° 42' 53" 75° 03' 00" 75° 28' 15" 75° 42' 60"	N/A
White Sands Missile Range	NM	Yes	Yes	34° 35' 05" 34° 43' 50" 34° 43' 17" 34° 26' 28" 32° 36' 02" 31° 45' 47" 31° 18' 18" 31° 27' 23" 32° 38' 49" 33° 32' 40"	107° 06' 05" 106° 46' 50" 106° 03' 17" 105° 26' 28" 104° 55' 02" 105° 22' 47" 106° 06' 18" 106° 54' 23" 107° 25' 49" 107° 27' 40"	N/A
Nevada Test and Training Range	NV	Yes	Yes	35° 58' 48" 36° 38' 22" 36° 22' 37" 36° 54' 03" 37° 58' 01" 38° 59' 48" 38° 58' 35" 37° 52' 34" 36° 20' 30" 36° 21' 15"	115° 31' 55" 116° 23' 51" 117° 41' 35" 117° 59' 18" 118° 01' 17" 116° 46' 01" 114° 49' 25" 113° 35' 46" 113° 39' 51" 115° 14' 23"	N/A
Fort Sill	OK	Yes	Yes	35° 03' 39" 35° 10' 31" 34° 42' 54" 34° 13' 49" 34° 13' 46" 34° 38' 26"	99° 02' 38" 98° 05' 47" 97° 45' 20" 98° 05' 49" 98° 56' 09" 99° 16' 57"	N/A

Location name	State	CPA	PUA	Latitude	Longitude	Radius (km)
Tobyhanna Army Depot	PA	Yes	-	41° 30' 25" 41° 38' 51" 41° 31' 41" 41° 11' 31" 40° 52' 07" 40° 44' 53" 40° 51' 43" 41° 07' 40"	75° 51' 60" 75° 26' 33" 75° 1' 39" 74° 50' 07" 75° 1' 2" 75° 23' 50" 75° 48' 52" 76° 00' 38"	N/A
Dahlgren*	VA	Yes	Yes	38° 23' 10" 38° 41' 25" 38° 46' 14" 38° 49' 37" 38° 50' 16" 38° 46' 30" 38° 49' 42" 38° 54' 42" 38° 55' 37" 38° 56' 05" 38° 44' 45" 38° 44' 22" 38° 35' 14" 38° 51' 04" 38° 26' 52" 38° 22' 59" 37° 59' 27" 37° 47' 08" 37° 54' 01" 38° 23' 10"	76° 23' 21" 76° 35' 56" 76° 44' 44" 76° 54' 57" 76° 58' 18" 77° 01' 57" 77° 04' 08" 77° 7' 35" 77° 12' 04" 77° 23' 5" 77° 25' 23" 77° 28' 48" 77° 36' 11" 78° 12' 06" 78° 29' 02" 77° 42' 19" 77° 28' 26" 76° 53' 47" 76° 06' 14" 76° 23' 21"	N/A
Newport News*	VA	Yes	Yes	36° 58' 24"	76° 26' 07"	93
Norfolk* (includes Fort Story SESEF range)	VA	Yes	-	36° 56' 24"	76° 19' 55"	74
Wallops Island*	VA	Yes	Yes	37° 51' 25"	75° 27' 59"	76

Location name	State	CPA	PUA	Latitude	Longitude	Radius (km)
Bremerton*	WA	Yes	Yes	47° 28' 40" 47° 31' 16" 47° 31' 13" 47° 34' 12" 47° 45' 36" 47° 59' 07" 48° 12' 20" 47° 39' 46" 47° 39' 12" 47° 45' 23" 47° 44' 48" 47° 57' 40" 47° 31' 15" 47° 35' 53" 47° 27' 33" 47° 27' 07" 47° 24' 25" 47° 23' 07" 47° 28' 33" 46° 50' 25" 46° 53' 09" 47° 28' 40"	122° 31' 22" 122° 31' 26" 122° 32' 37" 122° 31' 52" 121° 32' 28" 121° 34' 09" 121° 44' 51" 122° 29' 60" 122° 34' 35" 122° 38' 09" 122° 45' 18" 122° 59' 06" 123° 16' 23" 122° 49' 28" 122° 55' 25" 122° 46' 16" 122° 42' 48" 122° 39' 18" 122° 33' 44" 121° 49' 24" 121° 44' 01" 122° 31' 22"	N/A
Everett* (includes Ediz Hook SESEF range)	WA	Yes	-	47° 51' 11" 47° 25' 13" 47° 54' 45" 47° 36' 60" 47° 51' 57" 48° 35' 49" 48° 00' 8" 47° 51' 10"	122° 57' 47" 123° 18' 6" 122° 10' 13" 121° 37' 60" 121° 22' 57" 122° 08' 13" 123° 29' 33" 122° 57' 47"	N/A

PART 27 – MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

6. The authority citation for part 27 continues to read as follows:

AUTHORITY: [TO BE INSERTED PRIOR TO PUBLICATION OF SUMMARY IN FEDERAL REGISTER.]

7. Amend § 27.1 by adding paragraph (b)(17) to read as follows:

§ 27.1 Basis and purpose.

(b) ***

(17) 3450-3550 MHz.

8. Amend § 27.4 by adding in alphabetical order the definition for “3.45 GHz Service” to read as follows:

§ 27.4 Terms and definitions.

3.45 GHz Service. A radiocommunication service licensed under this part for the frequency bands specified in § 27.5(o) (3450-3550 MHz band).

* * * * *

9. Amend § 27.5 by adding paragraph (o) to read as follows:

§ 27.5 Frequencies.

* * * * *

(o) *3450-3550 MHz band.* The 3.45 GHz Service is licensed as ten individual 10 megahertz blocks available for assignment in the contiguous United States on a Partial Economic Area basis, *see* § 27.6(n).

10. Amend § 27.6 by adding paragraph (n) to read as follows:

§ 27.6 Service areas.

* * * * *

(n) *3450-3550 MHz Band.* Service areas in the 3.45 GHz Service are based on Partial Economic Areas (PEAs) as defined by appendix A to this subpart 27.

11. Amend § 27.11 by adding paragraph (m) to read as follows:

§ 27.11 Initial authorization.

* * * * *

(m) *3450-3550 MHz band.* Authorizations for licenses in the 3.45 GHz Service will be based on Partial Economic Areas (PEAs), as specified in § 27.6(n), and the frequency blocks specified in § 27.5(o).

12. Amend § 27.13 by adding paragraph (o) to read as follows:

§ 27.13 License period.

* * * * *

(o) *3450-3550 MHz Band.* Authorizations for licenses in the 3.45 GHz Service in the 3450-3550 MHz band will have a term not to exceed fifteen (15) years from the date of issuance.

13. Amend § 27.14 by revising the first sentences of paragraphs (a) and (k), and adding paragraph (w) to read as follows:

§ 27.14 Construction requirements.

(a) AWS and WCS licensees, with the exception of WCS licensees holding authorizations for the 600 MHz band, Block A in the 698-704 MHz and 728-734 MHz bands, Block B in the 704-710 MHz and 734-740 MHz bands, Block E in the 722-728 MHz band, Block C, C1 or C2 in the 746-757 MHz and 776-787 MHz bands, Block A in the 2305-2310 MHz and 2350-2355 MHz bands, Block B in the 2310-2315 MHz and 2355-2360 MHz bands, Block C in the 2315-2320 MHz band, Block D in the 2345-2350 MHz band, in the 3450-3550 MHz band, and in the 3700-3980 MHz band, and with the exception of licensees holding AWS authorizations in the 1915-1920 MHz and 1995-2000 MHz bands, the 2000-2020 MHz and 2180-2200 MHz bands, or 1695-1710 MHz, 1755-1780 MHz and 2155-2180 MHz bands, must, as a performance requirement, make a showing of “substantial service” in their license area within the prescribed license term set forth in § 27.13.* * *

* * * * *

(k) Licensees holding WCS or AWS authorizations in the spectrum blocks enumerated in paragraphs (g), (h), (i), (q), (r), (s), (t), (v), and (w) of this section, including any licensee that obtained its license pursuant to the procedures set forth in paragraph (j) of this section, shall demonstrate compliance

with performance requirements by filing a construction notification with the Commission, within 15 days of the expiration of the applicable benchmark, in accordance with the provisions set forth in § 1.946(d) of this chapter. * * *

* * * * *

(w) The following provisions apply to any licensee holding an authorization in the 3450-3550 MHz band:

(1) *Performance Requirements.* Licensees in the 3.45 GHz Service must meet the following benchmarks, based on the type of service they provide.

(a) *Mobile/Point-to-Multipoint Service.* Licensees relying on mobile or point-to-multipoint service shall provide reliable signal coverage and offer service within four (4) years from the date of the initial license to at least forty-five (45) percent of the population in each of its license areas (“First Performance Benchmark”). Licensees shall provide reliable signal coverage and offer service within eight (8) years from the date of the initial license to at least eighty (80) percent of the population in each of its license areas (“Second Performance Benchmark”).

(b) *Point-to-Point Service.* Licensees relying on point-to-point service shall demonstrate within four (4) years of the license issue date that, if the population within the license area is equal to or less than 268,000, they have four links operating and either provide service to customers or for internal use. If the population is greater than 268,000, they shall demonstrate they have at least one link in operation and either provide service to customers or for internal use per every 67,000 persons within a license area (“First Performance Benchmark”). Licensees shall demonstrate within eight (8) years of the license issue date that, if the population within license area is equal to or less than 268,000, they have eight links operating and either provide service to customers or for internal use. If the population within the license area is greater than 268,000, they shall demonstrate they have at least two links in operation and either provide service to customers or for internal use per every 67,000 persons within a license area (“Second Performance Benchmark”).

(c) *Internet of Things Service.* Licensees offering Internet of Things-type services shall provide geographic area coverage within four (4) years from the date of the initial license to thirty-five (35) percent of the license (“First Performance Benchmark”). Licensees shall provide geographic area coverage within eight (8) years from the date of the initial license to sixty-five (65) percent of the license (“Second Performance Benchmark”).

(2) *Failure to Meet Performance Requirements.* If a licensee fails to establish that it meets the First Performance Benchmark for a particular license area, the licensee’s Second Performance Benchmark deadline and license term will be reduced by one year. If a licensee fails to establish that it meets the Second Performance Benchmark for a particular license area, its authorization for each license area in which it fails to meet the Second Performance Benchmark shall terminate automatically without Commission action, and the licensee will be ineligible to regain it if the Commission makes the license available at a later date.

(3) *Compliance Procedures.* To demonstrate compliance with these performance requirements, licensees shall use the most recently available decennial U.S. Census Data at the time of measurement and shall base their measurements of population or geographic area served on areas no larger than the Census Tract level. The population or area within a specific Census Tract (or other acceptable identifier) will be deemed served by the licensee only if it provides reliable signal coverage to and offers service within the specific Census Tract (or other acceptable identifier). To the extent the Census Tract (or other acceptable identifier) extends beyond the boundaries of a license area, a licensee with authorizations for such areas may include only the population or geographic area within the Census Tract (or other acceptable identifier) towards meeting the performance requirement of a single, individual license. If a licensee does not provide reliable signal coverage to an entire license area, the licensee must provide a map that accurately depicts the boundaries of the area or areas within each license area not being served. Each licensee also must file supporting documentation certifying the type of service it is providing for each

licensed area within its service territory and the type of technology used to provide such service. Supporting documentation must include the assumptions used to create the coverage maps, including the propagation model and the signal strength necessary to provide reliable service with the licensee's technology.

14. Amend § 27.50 by adding paragraph (k) to read as follows:

§ 27.50 Power limits and duty cycle.

* * * * *

(k) The following power requirements apply to stations transmitting in the 3450-3550 MHz band:

(1) The power of each fixed or base station transmitting in the 3450-3550 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to an equivalent isotropically radiated power (EIRP) of 3280 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.

(2) The power of each fixed or base station transmitting in the 3450-3550 MHz band and situated in any geographic location other than that described in paragraph (k)(1) of this section is limited to an EIRP of 1640 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.

(3) Mobile devices are limited to 1Watt (30 dBm) EIRP. Mobile devices operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

(4) Equipment employed must be authorized in accordance with the provisions of § 27.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (k)(5) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

(5) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, and any other relevant factors, so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

15. Amend § 27.53 by

- a. Renumbering existing paragraph (n) as (o); and
- b. Adding new paragraph (n).

The addition reads as follows:

§ 27.53 Emission limits.

* * * * *

(n) *3.45 GHz Service.* The following emission limits apply to stations transmitting in the 3450-3550 MHz band:

(1) For base station operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with the provisions of this paragraph (n)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the

emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. Notwithstanding the channel edge requirement of -13 dBm per megahertz, for base station operations in the 3450-3550 MHz band, the conducted power of any emission below 3440 MHz or above 3560 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3430 MHz or above 3570 MHz shall not exceed -40 dBm/MHz.

(2) For mobile operations in the 3450-3550 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed -13 dBm/MHz. Compliance with this paragraph (n)(2) is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

16. Amend § 27.55 by adding paragraph (e) to read as follows:

§ 27.55 Power strength limits.

* * * * *

(e) *Power flux density for stations operating in the 3450-3550 MHz band.* For base and fixed stations operation in the 3450-3550 MHz band in accordance with the provisions of § 27.50(k), the power flux density (PFD) at any location on the geographical border of a licensee's service area shall not exceed -76 dBm/m²/MHz. This power flux density will be measured at 1.5 meters above ground. Licensees in adjacent geographic areas may voluntarily agree to operate under a higher PFD at their common boundary.

17. Amend § 27.57 by revising paragraph (c) to read as follows:

§ 27.57 International coordination.

* * * * *

(c) Operation in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, 2180-2200 MHz, 3450-3550 MHz, and 3700-3980 MHz bands is subject to international agreements with Mexico and Canada.

19. Amend § 27.75 by revising paragraph (a) by adding a new subparagraph (4) to read as follows:

§ 27.75 Basic Interoperability Requirement.

(a) * * *

* * * * *

(4) Mobile and portable stations that operate on any portion of frequencies in the 3450-3550 MHz band must be capable of operating on all frequencies in the 3450-3550 MHz band using the same air interfaces that the equipment utilizes on any frequencies in the 3450-3550 MHz band.

20. Add new Subpart Q to read as follows:

Subpart Q – 3.45 GHz Service (3450-3550 MHz)

Sec.

- 27.1600 3450-3550 MHz band subject to competitive bidding.
- 27.1601 Designated entities in the 3450-3550 MHz band.
- 27.1602 Incumbent federal operations.
- 27.1603 Coordination procedures.
- 27.1604 Reimbursement of relocation expenses of non-federal radiolocation incumbents.
- 27.1605 Reimbursement clearinghouse.
- 27.1606 Aggregation of 3450-3550 MHz band licenses.
- 27.1607 Information sharing for Time Division Duplex synchronization.

§ 27.1600 3450-3550 MHz band subject to competitive bidding.

Mutually exclusive initial applications for 3450-3550 MHz band licenses are subject to competitive bidding. The general competitive bidding procedures set forth in 47 CFR part 1, subpart Q of this chapter will apply unless otherwise provided in this subpart.

§ 27.1601 Designated entities in the 3450-3550 MHz band.

(a) *Eligibility for small business provisions.* (1) Definitions—(i) Small business. A small business is an entity that, together with its affiliates, its controlling interests, and the affiliates of its controlling interests, has average gross revenues not exceeding \$55 million for the preceding five (5) years.

(ii) *Very small business.* A very small business is an entity that, together with its affiliates, its controlling interests, and the affiliates of its controlling interests, has average gross revenues not exceeding \$20 million for the preceding five (5) years.

(2) *Bidding credits.* A winning bidder that qualifies as a small business, as defined in this section, or a consortium of small businesses as provided in § 1.2110(c)(6) of this chapter, may use the bidding credit of 15 percent, as specified in § 1.2110(f)(2)(i)(C) of this chapter, subject to the cap specified in § 1.2110(f)(2)(ii) of this chapter. A winning bidder that qualifies as a very small business, as defined in this section, or a consortium of very small businesses as provided in § 1.2110(c)(6) of this chapter, may use the bidding credit of 25 percent, as specified in § 1.2110(f)(2)(i)(B) of this chapter, subject to the cap specified in § 1.2110(f)(2)(ii) of this chapter.

(b) *Eligibility for rural service provider bidding credit.* A rural service provider, as defined in § 1.2110(f)(4)(i) of this chapter, that has not claimed a small business bidding credit, or a consortium of rural service providers as provided in § 1.2110(c)(6) of this chapter, may use the bidding credit of 15 percent specified in § 1.2110(f)(4) of this chapter.

§ 27.1602 Incumbent federal operations.

Regarding incumbent federal operations in the 3450-3550 MHz band, 3.45 GHz Service licensees must comply with footnote US431B of the Table of Frequency Allocations.

§ 27.1603 Coordination procedures.

(a) Prior to operation of any 3.45 GHz Service license in a Cooperative Planning Area or Periodic Use Area, a 3.45 GHz Service licensee must successfully coordinate such operation with any federal incumbents in the Cooperative Planning Area or Periodic Use Area. The coordination procedures contained in this part shall apply unless the 3.45 GHz Service licensee and the federal incumbent(s) have reached a mutually acceptable operator-to-operator coordination agreement that provides otherwise.

(b) *Informal Discussions.* Before a 3.45 GHz Service licensee submits a formal coordination request, it may share and discuss draft proposals with federal incumbent coordination staff. These discussions are voluntary, informal, and non-binding and can begin at any time.

(c) *Formal Coordination.* The 3.45 GHz Service licensee shall initiate coordination by formally requesting access to operate within a Cooperative Planning Area and/or Periodic Use Area directly through the Department of Defense's online portal.

(d) *Initiation, Timing, and Affirmative Concurrence.* A 3.45 GHz Service licensee must initiate a formal coordination request through the online portal provided by the Department of Defense. Unless otherwise agreed between a 3.45 GHz Service licensee and the relevant federal incumbent(s), no formal coordination requests may be submitted until nine (9) months after the date of the auction closing Public Notice. 3.45 GHz Service licensees may request informal discussions (through the point of contact identified in the applicable Transition Plan) during this nine-month time period. Unless otherwise agreed to in writing, the requirement to reach a coordination arrangement is satisfied only by obtaining the affirmative concurrence of the relevant federal incumbent(s) via the portal. This requirement is not satisfied by omission.

(e) *Submission Information.* To submit a formal coordination request, the 3.45 GHz Service licensee must include information about the technical characteristics for the 3.45 GHz Service base stations and associated mobile units relevant to operation within the Cooperative Planning Area and/or Periodic Use Area. This information should be provided in accordance with the instructions provided in the portal user's guide provided by the Department of Defense. 3.45 GHz Service licensees must prioritize their deployments in the Cooperative Planning Area for each federal incumbent when submitting a formal coordination request. If a 3.45 GHz Service licensee is seeking to coordinate with multiple systems or multiple locations of operation controlled by one federal incumbent, the licensee must specify the order in which it prefers the federal incumbent process the request (i.e., the order of systems or geographic locations).

(f) *Coordination Analysis.* If a 3.45 GHz Service licensee has questions about the result of a coordination request, it may contact the federal incumbent to propose network design modifications to help address issues raised by the federal incumbent. Once the 3.45 GHz Service licensee has revised its network design, it must resubmit a formal coordination request, and the 3.45 GHz Service formal coordination process begins again.

(g) *Interference resolution process.* In instances of identified harmful interference occurring between a federal and non-federal operator not otherwise addressed by the coordination procedures or operator-to-operator agreements, the 3.45 GHz Service licensee shall first attempt to resolve the interference directly. If that effort is unsuccessful, the 3.45 GHz Service licensee, if adversely affected may escalate the matter to the Commission.

§ 27.1604 Reimbursement of relocation expenses of non-federal radiolocation incumbents.

(a) *Relocation Reimbursement Contribution.* Each entity granted an initial license (not a renewal) in the 3.45 GHz Service (Licensee) must pay a *pro rata* portion to reimburse the costs incurred by authorized non-federal, secondary radiolocation licensees for relocating from the 3.3-3.55 GHz band. These costs include the cost of a clearinghouse's administration of the reimbursement, which the radiolocation licensees will pay initially and include in their reimbursable costs.

(b) *Pro Rata Share.* A Licensee's *pro rata* share of relocation costs will be determined by dividing the total actual costs of such relocation, as approved by the clearinghouse selected pursuant to section 27.1605, by the total number of 3.45 GHz Service licenses granted, multiplied by the number of such licenses the Licensee will hold.

(c) *Timing of Payment.* A Licensee's relocation reimbursement contribution share must be paid to the clearinghouse by the date(s) and subject to procedures specified by public notice.

§ 27.1605 Reimbursement clearinghouse.

(a) The clearinghouse ultimately selected shall determine the reimbursement obligations of each Licensee pursuant to section 27.1604.

(1) The clearinghouse must be a must be a neutral, independent entity with no conflicts of interest (as defined in section 27.1414(b)), on the part of the organization or its officers, directors, employees, contractors, or significant subcontractors.

(2) The clearinghouse must be able to demonstrate that it has the requisite expertise to perform the duties required, which will include collecting and distributing reimbursement payments, auditing incoming and outgoing estimates, mitigating cost disputes among parties, and generally acting as a clearinghouse.

(3) The clearinghouse must comply with, on an ongoing basis, all applicable laws and Federal Government guidance on privacy and information security requirements such as relevant provisions in the Federal Information Security Management Act, National Institute of Standards and Technology publications, and Office of Management and Budget guidance.

(4) The clearinghouse must provide quarterly reports to the Wireless Telecommunications Bureau that detail the status of reimbursement funds available, the payments issued, the amounts collected from licensees, and any information filed by incumbents. The reports must account for all funds spent, including the clearinghouse's own expenses. The report shall include descriptions of any disputes and the manner in which they were resolved.

(b) Non-federal secondary radiolocation licensees in the 3.3-3.55 GHz band that seek reimbursement of their expenses for relocating operations authorized under their licenses and existing as of February 22, 2019, must submit invoices or other appropriate documentation of such expenses to the clearinghouse no later than a date to be specified by public notice.

(c) Expenses must be reasonably related to the relocation from the 3.3-3.55 GHz band to the 2.9-3.0 GHz band, may be future expenses or expenses already incurred—including the clearinghouse's costs, and no expenses for other purposes will be subject to reimbursement. Ineligible expenses include, but are not limited to, those related to upgrades or improvements. The clearinghouse shall have the authority to determine whether particular expenses are eligible for reimbursement.

(d) The Wireless Telecommunications Bureau is responsible for resolving any disputes arising from decisions by the clearinghouse and shall specify by public notice when the clearinghouse's responsibilities have terminated.

§ 27.1606 Aggregation of 3450-3550 MHz band licenses.

(a) 3.45 GHz Service licensees may aggregate up to 40 megahertz of 3450-3550 MHz band licenses across both license categories in any service area at any given time for four years after the close of the auction. After four years post-auction, no such aggregation limit on 3450-3550 MHz licenses shall apply.

(b) The criteria in §20.22(b) of this chapter will apply in order to attribute partial ownership and other interests for the purpose of applying the aggregation limit in paragraph (a) of this section.

§ 27.1607 Information sharing for Time Division Duplex synchronization.

(a) 3.45 GHz Service licensees must provide information to requesting Citizens Broadband Radio Service (part 96 of this chapter) operators to enable time division duplex (TDD) synchronization. Negotiations over the information must be conducted in good faith, with the goal of enabling synchronization between the relevant systems.

(1) A Citizens Broadband Radio Service operator, whether a Priority Access Licensee or a General Authorized Access user (§ 96.1(b)), may request information from a 3.45 GHz Service licensee to enable cross-service TDD synchronization if it provides service, or intends to provide service, in the same or adjacent geographic area as a 3.45 GHz Service licensee.

(2) Upon request by an eligible Citizens Broadband Radio Service operator, the 3.45 GHz Service licensee must provide sufficient technical information to allow the Citizens Broadband Radio Service operator to synchronize its system with the 3.45 GHz band system. The 3.45 GHz Service licensee must keep this information current if its network operations change.

(b) 3.45 GHz Service licensees are under no obligation to make any changes to their operations or proposed operations to enable TDD synchronization.

APPENDIX B

Final Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),¹ an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in the *Report and Order and Further Notice of Proposed Rulemaking (3.1-3.55 GHz R&O and FNPRM)* released in October 2020.² The Commission sought written public comment on the proposals in the *3.1-3.55 GHz R&O and FNPRM*, including comment on the IRFA. No comments were filed addressing the IRFA. This present Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.³

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

2. The *Second Report and Order* adopted by the Commission today takes steps to advance Congressional and Commission objectives to make more mid-band spectrum available for fifth generation wireless services, or 5G. It allocated the 3.45 GHz band to add a co-primary non-federal fixed and mobile (except aeronautical mobile) allocation and creates a new 3.45 GHz Service for this spectrum, and adopted technical, licensing, and competitive bidding rules for this service largely consistent with its rules for other flexible-use wireless spectrum bands. The Commission did so with cooperation from the Department of Defense (DoD) to ensure that these operations will not cause harmful interference to ongoing federal spectrum use. While the majority of the federal operations in this band will be relocated to alternate spectrum, some operations will continue and must be protected from harmful interference through a system of coordination in specific Cooperative Planning Areas and Periodic Use Areas, described in the *Second Report and Order* and now contained in our rules.⁴ The competitive bidding rules adopted for the 3.45 GHz Service will ensure that, pursuant to the Commercial Spectrum Enhancement Act, the full cost of the relocation of federal operations in this band is covered by auction revenues.⁵

3. The addition of non-federal fixed and mobile (except aeronautical mobile) services to the U.S. Table of Frequency Allocations meets the requirements for allocating flexible use spectrum under Section 303(y) of the Communications Act of 1934, as amended: (1) the allocation is in the public interest; (2) the allocation does not deter investment in communications services, systems, or the development of technologies; and (3) such use would not result in harmful interference among users.⁶

4. This *Second Report and Order* is consistent with the Beat CHINA for 5G Act of 2020's direction that the Commission auction and license the 3.45 GHz band for flexible use.⁷ It also is consistent with the Commission's responsibilities, as specified in the MOBILE NOW Act, to work with the National Telecommunications and Information Administration (NTIA) to identify spectrum for new mobile and fixed wireless use and, specifically, to work in consultation with NTIA to evaluate the

¹ See 5 U.S.C. § 603. The RFA, 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 *Facilitating Shared Use in the 3100-3550 MHz Band*, WT Docket No. 19-348, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 11078 Appendix B, Paras. 1-27 (2020) (*3.1-3.55 GHz R&O and FNPRM*). For purposes of this document the Further Notice of Proposed Rule will be referenced as FNPRM.

³ See 5 U.S.C. § 604.

⁴ US Footnote US431B to the Table of Allocations describes and lists Cooperative Planning Areas and Periodic Use Areas where the Department of Defense will require continued access to the band. See Appendix A.

⁵ 47 U.S.C. § 309(j)(3)(F).

⁶ See 47 CFR § 303(y).

⁷ Consolidated Appropriations Act, 2021, Pub. L. 116-260, Division FF, Title IX, Sec. 905 (the Beat China by Harnessing Important, National Airwaves for 5G Act of 2020 or Beat CHINA for 5G Act of 2020).

feasibility of allowing commercial wireless services to share use of spectrum between 3.1 and 3.55 GHz.⁸ Continued technological developments make 3 GHz spectrum ideal for next generation wireless services, including 5G, and the repurposing of 3.5 GHz and 3.7 GHz band spectrum near the 3.45 GHz band presents an opportunity to make a large contiguous block of mid-band spectrum available. Collectively, the 3.45 GHz band and neighboring 3.5 GHz and 3.7 GHz bands could offer 530 megahertz of contiguous mid-band spectrum for flexible use. The *Second Report and Order* also resolved outstanding issues related to prior non-federal, secondary incumbents of this spectrum, adopting rules for the relocation and reimbursement of non-federal radiolocation operations and finalizing the bifurcation of the amateur band in this spectrum, allowing these operators to continue to access the lower portion of the band while flexible use licensing efforts continue.

5. Our actions in the *Second Report and Order* to finalize the rules governing flexible use of this band will increase investment in communications services and systems and technological development by providing maximum opportunities for deployment of flexible-use services while continuing to provide protection from harmful interference between these operations and those pursuant to flexible use licenses in the new 3.45 GHz band.

B. Summary of Significant Issues Raised by Public Comments in Response to the IRFA

6. There were no comments filed that specifically addressed the proposed rules and policies presented in the IRFA.

C. Response to Comments by Chief Counsel for Advocacy of the Small Business Administration

7. Pursuant to the Small Business Jobs Act of 2010, which amended the RFA, the Commission is required to respond to any comments filed by the Chief Counsel for Advocacy of the Small Business Administration (SBA), and to provide a detailed statement of any change made to the proposed rules as a result of those comments.⁹

8. The Chief Counsel did not file any comments in response to the proposed rules in this proceeding.

D. Description and Estimate of the Number of Small Entities to Which The Rules Will Apply

9. The RFA directs agencies to provide a description, and where feasible an estimate, of the number of small entities that may be affected by rules adopted herein.¹⁰ The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”¹¹ In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.¹² A “small business concern” is one which:

⁸ See Consolidated Appropriations Act, 2018, P.L. 115-141, Division P, the Repack Airwaves Yielding Better Access for Users of Modern Services (RAY BAUM’S) Act, Title VI (the Making Opportunities for Broadband Investment and Limiting Excessive and Needless Obstacles to Wireless Act or MOBILE NOW Act).

⁹ 5 U.S.C. § 604 (a)(3).

¹⁰ 5 U.S.C. § 604(a)(4).

¹¹ 5 U.S.C. § 601(6).

¹² 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.”

(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).¹³

10. *Small Businesses, Small Organizations, and Small Governmental Jurisdictions.* Our action may, over time, 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.¹⁴ 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.¹⁵ These types of small businesses represent 99.9 percent of all businesses in the United States, which translates to 30.7 million businesses.¹⁶

11. 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."¹⁷ The Internal Revenue Service (IRS) uses a revenue benchmark of \$50,000 or less to delineate its annual electronic filing requirements for small exempt organizations.¹⁸ Nationwide, for tax year 2018, there were approximately 571,709 small exempt organizations in the U.S. reporting revenues of \$50,000 or less according to the registration and tax data for exempt organizations available from the IRS.¹⁹

12. 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."²⁰ U.S. Census Bureau data from the 2017 Census of Governments²¹ indicate that there were 90,075 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States.²² Of this number there were

¹³ 15 U.S.C. § 632.

¹⁴ See 5 U.S.C. § 601(3)-(6).

¹⁵ See SBA, Office of Advocacy, "What's New With Small Business?", <https://cdn.advocacy.sba.gov/wp-content/uploads/2019/09/23172859/Whats-New-With-Small-Business-2019.pdf> (Sept 2019).

¹⁶ *Id.*

¹⁷ 5 U.S.C. § 601(4).

¹⁸ The IRS benchmark is similar to the population of less than 50,000 benchmark in 5 U.S.C § 601(5) that is used to define a small governmental jurisdiction. Therefore, the IRS benchmark has been used to estimate the number small organizations in this small entity description. See Annual Electronic Filing Requirement for Small Exempt Organizations — Form 990-N (e-Postcard), "Who must file,"

<https://www.irs.gov/charities-non-profits/annual-electronic-filing-requirement-for-small-exempt-organizations-form-990-n-e-postcard>. We note that the IRS data does not provide information on whether a small exempt organization is independently owned and operated or dominant in its field.

¹⁹ See Exempt Organizations Business Master File Extract (EO BMF), "CSV Files by Region," <https://www.irs.gov/charities-non-profits/exempt-organizations-business-master-file-extract-eo-bmf>. The IRS Exempt Organization Business Master File (EO BMF) Extract provides information on all registered tax-exempt/non-profit organizations. The data utilized for purposes of this description was extracted from the IRS EO BMF data for Region 1-Northeast Area (76,886), Region 2-Mid-Atlantic and Great Lakes Areas (221,121), and Region 3-Gulf Coast and Pacific Coast Areas (273,702) which includes the continental U.S., Alaska, and Hawaii. This data does not include information for Puerto Rico.

²⁰ 5 U.S.C. § 601(5).

²¹ See 13 U.S.C. § 161. The Census of Governments survey is conducted every five (5) years compiling data for years ending with "2" and "7". See also Census of Governments, <https://www.census.gov/programs-surveys/cog/about.html>.

²² See U.S. Census Bureau, 2017 Census of Governments – Organization Table 2. Local Governments by Type and State: 2017 [CG1700ORG02]. <https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html>. Local governmental jurisdictions are made up of general purpose governments (county, municipal and town or township)

(continued....)

36,931 general purpose governments (county²³, municipal and town or township²⁴) with populations of less than 50,000 and 12,040 special purpose governments - independent school districts²⁵ with enrollment populations of less than 50,000.²⁶ Accordingly, based on the 2017 U.S. Census of Governments data, we estimate that at least 48,971 entities fall into the category of “small governmental jurisdictions.”²⁷

13. *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.²⁸ The appropriate size standard under SBA rules is that such a business is small if it has 1,500 or fewer employees.²⁹ For this industry, U.S. Census Bureau data for 2012 show that there were 967 firms that operated for the entire year.³⁰ Of this total, 955 firms had employment of 999 or fewer employees and 12 had employment of 1000 employees or more.³¹ Thus under this category and the associated size standard, the Commission estimates that the majority of Wireless Telecommunications Carriers (except Satellite) are small entities.

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and special purpose governments (special districts and independent school districts). *See also* Table 2. CG1700ORG02 Table Notes_Local Governments by Type and State_2017.

²³ *See* U.S. Census Bureau, 2017 Census of Governments - Organization, Table 5. County Governments by Population-Size Group and State: 2017 [CG1700ORG05]. <https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html>. There were 2,105 county governments with populations less than 50,000. This category does not include subcounty (municipal and township) governments.

²⁴ *See* U.S. Census Bureau, 2017 Census of Governments - Organization, Table 6. Subcounty General-Purpose Governments by Population-Size Group and State: 2017 [CG1700ORG06]. <https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html>. There were 18,729 municipal and 16,097 town and township governments with populations less than 50,000.

²⁵ *See* U.S. Census Bureau, 2017 Census of Governments - Organization, Table 10. Elementary and Secondary School Systems by Enrollment-Size Group and State: 2017 [CG1700ORG10]. <https://www.census.gov/data/tables/2017/econ/gus/2017-governments.html>. There were 12,040 independent school districts with enrollment populations less than 50,000. *See also* Table 4. Special-Purpose Local Governments by State Census Years 1942 to 2017 [CG1700ORG04], CG1700ORG04 Table Notes_Special Purpose Local Governments by State_Census Years 1942 to 2017.

²⁶ While the special purpose governments category also includes local special district governments, the 2017 Census of Governments data does not provide data aggregated based on population size for the special purpose governments category. Therefore, only data from independent school districts is included in the special purpose governments category.

²⁷ This total is derived from the sum of the number of general purpose governments (county, municipal and town or township) with populations of less than 50,000 (36,931) and the number of special purpose governments - independent school districts with enrollment populations of less than 50,000 (12,040), from the 2017 Census of Governments - Organizations Tables 5, 6, and 10.

²⁸ *See* U.S. Census Bureau, 2017 NAICS Definition, “517312 Wireless Telecommunications Carriers” (except Satellite), <https://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517312&search=2017%20NAICS%20Search>.

²⁹ *See* 13 CFR § 121.201, NAICS Code 517312 (previously 517210).

³⁰ *See* U.S. Census Bureau, 2012 Economic Census of the United States, Table ID: EC1251SSSZ5, Information: Subject Series: Estab and Firm Size: Employment Size of Firms for the U.S.: 2012, NAICS Code 517210, <https://data.census.gov/cedsci/table?text=EC1251SSSZ5&n=517210&tid=ECNSIZE2012.EC1251SSSZ5&hidePreview=false&vintage=2012>.

³¹ *Id.* Available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

14. *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.

15. *Fixed Microwave Services*. Microwave services include common carrier,³² private-operational fixed,³³ and broadcast auxiliary radio services.³⁴ They also include the Upper Microwave Flexible Use Service³⁵, Millimeter Wave Service³⁶, Local Multipoint Distribution Service (LMDS),³⁷ the Digital Electronic Message Service (DEMS),³⁸ and the 24 GHz Service,³⁹ where licensees can choose between common carrier and non-common carrier status.⁴⁰ 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.⁴¹ 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)⁴² 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.⁴³ For this industry, U.S. Census Bureau data for 2012 show that there were 967 firms that operated for the entire year.⁴⁴ Of this total, 955 firms had employment of 999 or fewer employees and 12 had employment of 1000 employees or more.⁴⁵ 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.

³² See 47 CFR part 101, Subparts C and I.

³³ See 47 CFR part 101, Subparts C and H.

³⁴ 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.

³⁵ See 47 CFR part 30.

³⁶ See 47 CFR part 101, Subpart Q.

³⁷ See 47 CFR part 101, Subpart L.

³⁸ See 47 CFR part 101, Subpart G.

³⁹ See *id.*

⁴⁰ See 47 CFR §§ 101.533, 101.1017.

⁴¹ These statistics are based on a review of the Universal Licensing System on September 22, 2015.

⁴² See U.S. Census Bureau, *2017 NAICS Definition*, "517312 Wireless Telecommunications Carriers (except Satellite)", <https://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517312&search=2017%20NAICS%20Search>.

⁴³ See 13 CFR § 121.201, NAICS Code 517312 (previously 517210).

⁴⁴ See U.S. Census Bureau, *2012 Economic Census of the United States*, Table ID: EC1251SSSZ5, *Information: Subject Series, Estab and Firm Size: Employment Size of Firms for the U.S.: 2012*, NAICS Code 517210, <https://data.census.gov/cedsci/table?text=EC1251SSSZ5&n=517210&tid=ECNSIZE2012.EC1251SSSZ5&hidePreview=false&vintage=2012>.

⁴⁵ *Id.* Available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

16. The Commission does not have data specifying the number of these licensees that have more than 1,500 employees, and thus is unable at this time to estimate with greater precision the number of fixed microwave service licensees that would qualify as small business concerns under the SBA's small business size standard. Consequently, the Commission estimates that there are up to 36,708 common carrier fixed licensees and up to 59,291 private operational-fixed licensees and broadcast auxiliary radio licensees in the microwave services that may be small and may be affected by the rules and policies discussed herein. We note, however, that the microwave fixed licensee category includes some large entities.

17. *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).⁴⁶ 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.⁴⁷ The SBA has established a size standard for this industry as all such firms having 750 or fewer employees.⁴⁸ U.S. Census Bureau data for 2012 show that 383 establishments operated in that year.⁴⁹ Of that number, 379 operated with fewer than 500 employees and 4 had 500 to 999 employees.⁵⁰ Based on this data, we conclude that the majority of Other Communications Equipment Manufacturers are small.

18. *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.⁵¹ 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.⁵² The SBA has established a size standard for this industry of 1,250 employees or less.⁵³ U.S. Census Bureau data for 2012 show that 841 establishments operated in this industry in that year.⁵⁴ Of that number, 828 establishments operated with fewer than 1,000 employees, 7 establishments

⁴⁶ See U.S. Census Bureau, *2017 NAICS Definition*, "334290 Other Communications Equipment Manufacturing", <https://www.census.gov/cgi-bin/sssd/naics/naicsrch?input=334290&search=2017+NAICS+Search&search=2017>.

⁴⁷ *Id.*

⁴⁸ See 13 CFR 121.201, NAICS Code 334290.

⁴⁹ See U.S. Census Bureau, *2012 Economic Census of the United States*, Table ID: EC1231SG2, *Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2012*, NAICS Code 334290, <https://data.census.gov/cedsci/table?text=EC1231SG2&n=334290&tid=ECNSIZE2012.EC1231SG2&hidePreview=false&vintage=2012>.

⁵⁰ *Id.* The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

⁵¹ See U.S. Census Bureau, *2017 NAICS Definition*, "334220 Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing" <https://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=334220&search=2017>.

⁵² *Id.*

⁵³ See 13 CFR § 121.201, NAICS Code 334220.

⁵⁴ See U.S. Census Bureau, *2012 Economic Census of the United States*, Table ID: EC1231SG2, *Manufacturing: Summary Series: General Summary: Industry Statistics for Subsectors and Industries by Employment Size: 2012*, NAICS Code 334220, <https://data.census.gov/cedsci/table?text=EC1231SG2&n=334220&tid=ECNSIZE2012.EC1231SG2&hidePreview=false>.

operated with between 1,000 and 2,499 employees and 6 establishments operated with 2,500 or more employees.⁵⁵ Based on this data, we conclude that a majority of manufacturers in this industry are small.

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

19. The rules adopted in the *Second Report and Order* to create a new 3.45 GHz Service operating between 3.45-3.55 GHz will impose new and/or additional reporting or recordkeeping and/or other compliance obligations on small entities as well as other applicants and licensees. Given the proximity of the 3.45 GHz band to the 3.7 GHz band, in many instances, the adopted reporting, recordkeeping, and other compliance requirements mirror and align with requirements the Commission adopted in the reallocation of the 3.7 GHz band for fixed and mobile use. The reporting, recordkeeping and other compliance obligations adopted for small entities and other licensees are described below.

20. *Cooperative Sharing in the 3.45 GHz Band.* In the *Second Report and Order*, we adopted a cooperative sharing regime for the 3.45 GHz band where non-federal systems generally will have unencumbered full-power use of the entire band across the contiguous United States and, with limited exceptions, federal systems operating in the band may not cause harmful interference to non-federal operations in the band. In limited circumstances and locations where federal systems will remain in the band, non-federal systems will not be entitled to protection against harmful interference from federal operations (and limited restrictions may be placed on non-federal operations). Under the following circumstances: (1) in Cooperative Planning Areas; and (2) in Periodic Use Areas,⁵⁶ incumbent federal operations⁵⁷ and new non-federal fixed and mobile operations must coordinate with each other to facilitate shared use of the band in these specified areas and during specified time periods.

21. The coordination procedures include various requirements that impose reporting, recordkeeping and other compliance obligations on 3.45 GHz Service licensees. For example, a 3.4 GHz Service licensee must submit a formal request to the relevant federal incumbent requesting access to operate within a Cooperative Planning or Periodic Use Area, which must include information about the technical characteristics for the 3.45 GHz Service base stations and associated mobile units relevant to operation within the Cooperative Planning Area or Periodic Use Area. In addition, we established compliance obligations for submission of information; coordination analysis; and interference resolution processes. To ensure compliance with Cooperative Planning and Periodic Use Areas we included a detailed list of such areas in part 2 of the Commission's rules.⁵⁸

22. *The 3.45 GHz Band Plan.* In the *Second Report and Order*, we allocated the 3.45 GHz band as an unpaired band to be licensed on an exclusive, geographic license area basis using Partial Economic Areas (PEAs) in 10 megahertz blocks. We did not impose any guard bands.

23. *Licensing and Operating Rules.* The *Second Report and Order* required that licensees in the 3.45 GHz Service comply with certain licensing and operating rules applicable to all part 27 services,⁵⁹ including assignment of licenses by competitive bidding,⁶⁰ flexible use,⁶¹ regulatory status,⁶²

⁵⁵ *Id.* The available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that meet the SBA size standard.

⁵⁶ See US431B, Appendix A.

⁵⁷ Incumbent operations include all current and planned federal use in the 3.45 GHz band.

⁵⁸ See 47 CFR part 2, Appendix A.

⁵⁹ The *WRS Renewal 2nd R&O and FNPRM* adopted a unified framework for construction, renewal, and service continuity rules for flexible use geographic licenses in the Wireless Radio Services. See *Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal et al.*, WT Docket No. 10-112, Second Report and Order and Further Notice of Proposed Rulemaking and Order, 32 FCC Rcd 8874 (2017) (*WRS Renewal Reform 2nd R&O and FNPRM*).

foreign ownership reporting,⁶³ compliance with construction notification requirements,⁶⁴ renewal criteria,⁶⁵ permanent discontinuance of operations,⁶⁶ partitioning and disaggregation,⁶⁷ and spectrum leasing.⁶⁸ In addition, small entities and other future 3.45 GHz band licensees have to comply with service-specific requirements for the band addressing eligibility, mobile spectrum holdings policies, license term, performance requirements, renewal term construction obligations, and other licensing and operating rules some of which include reporting and recordkeeping obligations. Licensees in this band will also be required to negotiate in good faith with operators in the neighboring Citizens Broadband Radio Service regarding information sharing which will enable time division duplex synchronization across services.

- *Eligibility, License Term and Renewal.* The *Second Report and Order* adopted an open eligibility standard has been adopted for licensing in the 3.45 GHz Service, along with a 15-year initial term for new flexible-use licenses. We also applied our general part 27 renewal requirements for wireless licenses as the renewal standard for the 3.45 GHz band, as the Commission did in the 3.7 GHz Service and the 3.5 GHz band orders.

- *Performance Benchmark Requirements.* We adopted reporting on performance metrics similar to those adopted in the order for the 3.7 GHz service, but with shorter deadlines. Specifically, we required 3.45 GHz licensees offering mobile or point-to-multipoint services to provide reliable signal coverage and offer service to at least 45% of the population in each of their license areas within four years of the license issue date (first performance benchmark), and to at least 80% of the population in each of their license areas within eight years from the license issue date (second performance benchmark). We also adopted alternative metrics for point-to-point services and Internet-of-Things services under these same timelines.

- *Failure to Meet Performance Requirements.* Along with performance benchmarks, we required that, in the event a licensee fails to meet the first performance benchmark, the licensee's second benchmark and license term would be reduced by one year, thereby requiring it to meet the second performance benchmark one year sooner (at 7 years into the license term) and reducing its license term to 14 years. If a licensee fails to meet the second performance benchmark for a particular license area, its authorization for each license area in which it fails to meet the performance requirement shall terminate automatically without Commission action. In the event a 3.45 GHz Service licensee's authority to operate terminates, its spectrum rights should become available for reassignment pursuant to the competitive bidding provisions of section 309(j). Further, consistent with the Commission's rules for

(Continued from previous page) _____

⁶⁰ 47 U.S.C. § 309(j); 47 CFR §§ 1.2101-1.2114.

⁶¹ 47 CFR §§ 2.106, 27.2, 27.3. Section 303(y) of the Act provides the Commission with authority to provide for flexibility of use if: "(1) such use is consistent with international agreements to which the United States is a party; and (2) the Commission finds, after notice and an opportunity for public comment, that (A) such an allocation would be in the public interest; (B) such use would not deter investment in communications services and systems, or technology development; and (C) such use would not result in harmful interference among users." Balanced Budget Act of 1997, Pub. L. No. 105-33, 111 Stat. 251, 268-69; 47 U.S.C. § 303(y).

⁶² 47 CFR § 27.10.

⁶³ 47 U.S.C. § 310; 47 CFR § 27.12.

⁶⁴ 47 CFR § 27.14(k).

⁶⁵ *Id.* § 1.949.

⁶⁶ *Id.* § 1.953.

⁶⁷ *Id.* § 1.950.

⁶⁸ *Id.* § 1.9001 *et seq.*

other part 27 licenses, any 3.45 GHz band flexible use licensee that forfeits its license for failure to meet its performance requirements is precluded from regaining that license.⁶⁹

- *Compliance Procedures.* In addition to compliance procedures applicable to all part 27 licensees, we adopted a rule requiring the submission of electronic coverage maps that accurately depict both the boundaries of each licensed area and the coverage boundaries of the actual areas to which the licensee provides service or in the case of a fixed deployment, the locations of the fixed transmitters associated with each link. If a licensee does not provide reliable signal coverage to an entire license area, it must provide a map that accurately depicts the boundaries of the area or areas within each license area not being served. Each licensee must file supporting documentation certifying the type of service it is providing for each licensed area within its service territory and the type of technology used to provide such service. Supporting documentation must include the assumptions used to create the coverage maps, including the propagation model and the signal strength necessary to provide reliable service with the licensee's technology. We specifically requested comments on whether there are special or unique issues that small entities face with respect to the transition which would necessitate additional time for them to comply, but we did not receive any such comments.

- *Competitive Bidding Procedures.* The *Second Report and Order* adopted rules governing auctions for licenses in the 3.45 GHz Service in conformity with the general competitive bidding rules set forth in Part 1, subpart Q, of the Commission's rules and consistent with the competitive bidding procedures used in previous auctions.⁷⁰ In addition, we made bidding credits available for the 3.45 GHz Service, for entities designated as very small businesses, small businesses and rural service providers. For small entities, as proposed in the *FNPRM*, we adopted the same definitions that the Commission has used in recent years, for other flexible use licenses, bidding credits for the two larger designated entity business sizes provided in the Commission's part 1 standardized schedule of bidding credits. Specifically, a small business is an entity with average gross revenues for the preceding five years not exceeding \$55 million, and such an entity is eligible for a bidding credit of 15%. A very small business is an entity with average gross revenues for the preceding five years not exceeding \$20 million and is eligible for a bidding credit of 25%.⁷¹ The adopted bidding credit for rural service providers awards a 15% bidding credit to those entities that service predominantly rural areas and have fewer than 250,000 combined wireless, wireline, broadband and cable subscribers.

24. *Technical Rules.* Small entities and other licensees are also subject to certain technical rules established to maximize flexible use of the 3.45 GHz band while minimizing the impact on adjacent band incumbents and ongoing federal operations in the band, consistent with the public interest. In that context, we aligned the technical rules for this band with those adopted in the 3.7 GHz band in order to promote maximum flexibility for 5G deployments. We adopted technical rules regarding power limits,

⁶⁹ Our decision comports with actions taken for other licenses. See, e.g., 47 CFR § 27.14(a) (AWS-1 and AWS-3), (q)(6) (AWS-4), (r)(4) (H Block), *3.7 GHz Service Order*, 35 FCC Rcd at 2389, para. 103.

⁷⁰ See 47 CFR §§ 1.2101-1.2114.

⁷¹ The standardized schedule of bidding credits provided in Section 1.2110(f)(2)(i) defines small businesses based on average gross revenues for the preceding three years. In December 2018, Congress revised the standard set out in the Small Business Act for categorizing a business concern as a "small business concern," by changing the annual average gross receipts benchmark from a three-year period to a five-year period. Thus, as a general matter, a federal agency cannot propose to categorize a business concern as a "small business concern" for Small Business Act purposes unless the size of the concern is based on its annual average gross receipts "over a period of not less than 5 years." 15 U.S.C. § 632(a)(2)(C)(ii)(II), *as amended by* Small Business Runway Extension Act of 2018, Pub. L. 115-324 (Dec. 17, 2018). We therefore propose to adopt the Small Business Act's revised five-year average gross receipts benchmark for purposes of determining which entities qualify for small business bidding credits. But because the SBA has not yet revised its regulations to update the definition of "small business concern," for purposes of compliance with the Regulatory Flexibility Act, the Commission will continue to use the SBA's current definitions of "small business," which is based on a three-year benchmark.

out-of-band emissions limits, antenna height limits, service area boundary limits, international coordination requirements, intraband operability requirements, and any other technical rules that will maximize flexible use of the band while protecting non-federal licensees and federal incumbents in adjacent bands and in Cooperative Planning Areas and Periodic Use Areas.

25. *Non-Federal Incumbents.* In the *Second Report and Order*, we adopted rules finalizing the clearing of non-federal, secondary incumbents from the 3.45 GHz band, which includes non-federal radiolocation and amateur operations. Secondary, non-federal radiolocation licensees must relocate their operations by the sunset date of the secondary radiolocation authorization, which is 180 days after the new flexible-use licenses are granted. In order to ensure the speedy clearing of the 3.3-3.55 GHz band and to minimize disruptions to the weather radar systems operated by secondary radiolocation users, new flexible-use licensees in the 3.45 GHz Service are required to reimburse secondary, non-federal radiolocation licensees for reasonable costs related to the relocation of those operations to the 2.9-3.0 GHz band. Relocation reimbursement costs will be shared by all 3.45 GHz Service licensees, regardless of location, rather than only those whose licenses would otherwise have been encumbered by the relocating incumbent operations. All new entrants to the band will be responsible for reimbursement of a *pro rata* share of reasonable relocation costs of non-federal radiolocation operations. In other words, the total relocation costs will be divided by the number of 3.45 GHz Service licenses and each licensee will be required to pay their share based on the number of licenses they hold.

26. Amateur operators will be permitted to continue use of the spectrum between 3.3-3.45 GHz while Commission planning for future flexible-use licensing in this spectrum continues, because we adopted our proposal to bifurcate the band and adjusted our proposal setting 3450 MHz as the frequency at which the band will be split. Amateur licensees remain secondary users, and those that operate on frequencies close to the 3450 MHz band edge must do so with particular caution to avoid causing harmful interference to primary status, flexible-use licensees in the 3.45 GHz Service. Amateur operations between 3450 MHz and 3500 MHz must cease within 90 days of the public notice announcing the close of the auction for the 3.45 GHz Service, as specified in the *Second Report and Order*, and will not receive relocation reimbursement costs. Because amateur operations already occur in this spectrum, there are no new burdens associated with these decisions by the Commission.

27. To comply with these rules, small entities may be required to hire attorneys, engineers, consultants, or other professionals. In particular, for small entities that are not existing operators and do not have existing staffing dedicated to regulatory compliance, engineering and legal expertise may be required to make the requisite filings and to demonstrate compliance with the proposed performance obligations. No comments were filed regarding the cost implications of our proposals on small entities. Thus, while the Commission cannot quantify the cost of compliance with the rule adopted for the 3.45 GHz Service, we note that many of the requirements are consistent with and mirror existing requirements policies for other bands and other part 27 flexible use licenses. Therefore, small entities with existing licenses in other bands may already be familiar with such policies and requirements and have the processes and procedures in place to facilitate compliance, resulting in minimal incremental costs to comply with similar requirements adopted for the 3.45 GHz Service.

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

28. The RFA requires an agency to describe any significant, specifically small business, alternatives that it has considered in reaching its 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.”⁷²

29. The Commission has taken steps to minimize the economic burden on small entities from the rule changes and approaches adopted in the *Second Report and Order*. More specifically, we apply existing requirements applicable in other spectrum bands to the 3.45 GHz Service wherever possible. Given the 3.45 GHz band’s proximity to and possibility of aligning with the Commission’s recent reallocation of the 3.7 GHz band for fixed and mobile use, we apply many of the rules recently adopted for that band in order to facilitate efficiencies and synergies with the 3.7 GHz band. This should lessen the compliance costs for small entities that are already subject to these requirements and have processes and procedures in place for compliance. As such, these entities may only incur incremental costs to scale their operations for 3.45 GHz Service compliance. Below we describe areas where we have taken such an approach.

- *Allocation.* We provided flexibility for new 3.45 GHz Service licensees to tailor the use of the band to their specific operational needs and to maximize network efficiency.⁷³
- *Spectrum Block Size.* Given the potential of the 3.45 GHz band to allow opportunities for smaller carriers to compete with the dominant nationwide carriers and to promote broadband deployment of this spectrum in rural areas, proximity to and possibility of aligning with the Commission’s recent reallocation of the 3.7 GHz band for fixed and mobile use, we adopted 10 megahertz blocks for this band. We considered but declined an alternative proposal by commenters to adopt 20 megahertz blocks instead of 10 megahertz blocks for this spectrum. We disagreed with commenters that licensing this spectrum in 20 megahertz blocks is necessary to facilitate efficiencies and synergies with the 3.7 GHz band and spectrum aggregation and equipment harmonization across the core 5G bands; licensees will be free to aggregate spectrum in this band to form larger channels as needed. We also found that it is appropriate to adopt a bright-line, pre-auction limit of 40 megahertz in the 3.45 GHz band. We concluded that an in-band spectrum aggregation limit will help to promote spectrum access and encourage competition in the provision of 5G services, while still supporting the efficient and intensive use of spectrum.
- *Spectrum Block Configuration.* To promote a consistent spectral environment with the nearby mid-band allocations in the 3.5 GHz and 3.7 GHz bands, which are used as unpaired spectrum in the United States, we allocated the 3.45 GHz Service as an unpaired band. We considered but declined commenters suggestion to require Time Division Duplex (TDD) synchronization between networks operating in different blocks in this band and those in adjacent bands. While we recognize that TDD synchronization may assist in ensuring non-interference between operations, we believe that the decision whether to adopt such synchronization should be left to inter-system coordination efforts. We therefore required only good faith negotiations over information sharing to enable such synchronization, with no requirement that 3.45 GHz licensees modify their operations.
- *Use of Geographic Licensing.* Consistent with our approach in several other bands used to provide fixed and mobile services, we licensed the 3.45 GHz Service on an exclusive, geographic area basis.
- *Geographic License Area Size.* We find that Partial Economic Areas are the appropriate license area for the technical rules we adopt in this band. Given our decision to adopt higher-powered operation in this band, PEAs will better assist carriers in making the most of the capabilities of 5G networks and encourage investment in furtherance of the goals found in section 303(y) of the Communications Act. These higher power levels allow larger coverage areas and encourage providers to take advantage of macro-cell deployments where possible, which are better suited to PEAs than a smaller license area. The availability of spectrum aggregation across other bands with similar technical rules

⁷² 5 U.S.C. § 604(a)(6).

⁷³ See 47 CFR § 2.106.

make PEAs a better choice for the 3.45 GHz Service. While we recognized that there are benefits of smaller license areas as a general matter, we declined to adopt license areas smaller than PEAs for the 3.45 GHz band, given our decision to allow higher-powered operations in this band. In the *Second Report and Order*, we provide other means for small and rural entities to face a more level playing field in the 3.45 GHz band auction, including by adopting a 40-megahertz in-band spectrum aggregation limit and bidding credits for small and rural entities.

- *License Term.* We are cognizant that small entities must allocate resources carefully over the length of their license term and have more limited funds should they be required to compete at auction for a particular license. We therefore believe that our decision to apply a 15-year license term will provide the certainty of a longer license term which should give small entities sufficient incentive to make the long-term investments necessary for compliance. We declined suggestions to align the 3.45 GHz licensing rules with Citizen Broadband Radio Service which has 10-year license terms. We did not find a shorter license term appropriate here.

- *Renewal.* Consistent with the renewal standard for the 3.7 GHz Service and the Citizens Broadband Radio Service, we applied our general part 27 renewal requirements for wireless licenses to the 3.45 GHz Service and include the 3.45 GHz Service in the unified renewal framework for Wireless Radio Services.

- *Performance Requirements, Failure Penalties, and Compliance Procedures.* The requirements and procedures adopted in the *Second Report and Order* in these areas are based on existing part 27 reporting, recordkeeping and compliance requirements that apply for 3.7 GHz Service.

- *Technical Rules.* Many of the technical rules adopted in the *Second Report and Order* based on the rules adopted for the 3.7 GHz band or for other mid-band spectrum, which are similar to the 3.45 GHz band. For example, we adopted base station power levels which are the same as those adopted for the 3.7 GHz Service. We considered alternative arguments for lower levels but determined the power level adopted for the 3.4 GHz Service will provide licensees with the flexibility to optimize their network design for wide area coverage while still enabling successful coexistence with incumbent and adjacent band operations. Similarly, consistent with the part 27 AWS rules for antenna height limits, we did not restrict antenna heights for 3.4 GHz band operations beyond the requirements necessary to ensure physical obstructions do not impact air navigation safety.

- *Competitive Bidding and Bidding Credits for Small Entities.* The Commission administers bidding credit programs to promote small business service provider participation in auctions and in the provision of spectrum-based services. Based on analysis of past auction data, the relative costs of participation are lowered for small businesses that take full advantage of the bidding credit programs. Consistent with our approach for the 3.7 GHz Service and other flexible use bands, we will conduct an auction for licenses for the 3.45 GHz Service in conformity with the general competitive bidding rules set forth in Part 1, Subpart Q, of the Commission's rules and use competitive bidding procedures used by the Commission in previous auctions.⁷⁴ Similarly, for the 3.45 GHz Service we applied the definition of a qualifying "small business" and a "very small business"⁷⁵ and the definition of a rural service provider

⁷⁴ See 47 CFR §§ 1.2101-1.2114.

⁷⁵ The standardized schedule of bidding credits provided in Section 1.2110(f)(2)(i) defines small businesses based on average gross revenues for the preceding three years. In December 2018, Congress revised the standard set out in the Small Business Act for categorizing a business concern as a "small business concern," by changing the annual average gross receipts benchmark from a three-year period to a five-year period. Thus, as a general matter, a Federal agency cannot propose to categorize a business concern as a "small business concern" for Small Business Act purposes unless the size of the concern is based on its annual average gross receipts "over a period of not less than 5 years." 15 U.S.C. § 632(a)(2)(C)(ii)(II), *as amended by* Small Business Runway Extension Act of 2018, Pub. L. 115-324 (Dec. 17, 2018). We therefore propose to adopt the Small Business Act's revised five-year average gross receipts benchmark for purposes of determining which entities qualify for small business bidding credits. But because the SBA has not yet revised its regulations to update the definition of "small business concern," for

(continued....)

and utilize the associated bidding credits for these categories consistent with past auctions in flexible use bands.

Report to Congress

30. The Commission will send a copy of the *Second Report and Order, Order on Reconsideration and Order of Proposed Modification*, including this FRFA, in a report to Congress pursuant to the Congressional Review Act.⁷⁶ In addition, the Commission will send a copy of the *Second Report and Order, Order on Reconsideration and Order of Proposed Modification*, including this FRFA, to the Chief Counsel for Advocacy of the SBA. A copy of the *Second Report and Order, Order on Reconsideration and Order of Proposed Modification* and FRFA (or summaries thereof) will also be published in the Federal Register.⁷⁷

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purposes of compliance with the Regulatory Flexibility Act, the Commission will continue to use the SBA's current definitions of "small business," which is based on a three-year benchmark.

⁷⁶ See 5 U.S.C. § 801(a)(1)(A).

⁷⁷ See 5 U.S.C. § 604(b).

APPENDIX C
List of Commenters

Comments

5G Americas
Aerospace Industries Association
American Petroleum Institute (API)
ARRL, the National Association for Amateur Radio
AT&T Services, Inc.
CBRS Alliance
Charter Communications, Inc. (Charter)
CommScope, Inc.
Competitive Carriers Association (CCA)
Cox Communications, Inc. (Cox)
CTIA
Dynamic Spectrum Alliance
Dynetics, Inc.
Ericsson
Federated Wireless, Inc.
Google LLC
Lockheed Martin Corporation
Microsoft Corporation
Moise Advisory
NBCUniversal Media, LLC
NCTA – The Internet & Television Association (NCTA)
New America’s Open Technology Institute (OTI)
Nexstar Broadcasting, Inc. (Nexstar)
Nokia
NTCA – The Rural Broadband Association (NTCA)
Public Knowledge
Qualcomm Inc.
Regulatory and Technology Committee of the Energy Telecommunications and Electrical Association (ENTELEC)
Robert Pestolesi
Ron Economos
The Rural Wireless Association (RWA)
Sony Electronics Inc.
Southern Communications Services, Inc. (d/b/a Southern Linc)
Stephen Williams
T-Mobile USA, Inc.
Verizon
William R. Farrer
The Wireless Innovation Forum
Wireless Internet Service Providers Association (WISPA)
U.S. Territories Service Providers (AST Telecom d/b/a BlueSky and DOCOMO Pacific, Inc.)

Reply Comments

5G Americas
Aerospace Industries Association
AT&T Services, Inc.

Competitive Carriers Association (CCA)
CTIA
Dynamic Spectrum Alliance
Federated Wireless, Inc.
Lockheed Martin Corporation
NBCUniversal Media, LLC
NCTA – The Internet & Television Association (NCTA)
NTCA – The Rural Broadband Association (NTCA)
Sony Electronics Inc.
Southern Communications Services, Inc. (d/b/a Southern Linc)

**STATEMENT OF
ACTING CHAIRWOMAN JESSICA ROSENWORCEL**

Re: *Facilitating Shared Use in the 3100-3550 MHz Band, WT Docket No. 19-348;*
Auction of Flexible-Use Service Licenses in the 3.45-3.55 GHz Band

As the Acting Chairwoman of the Federal Communications Commission, I know firsthand that our nation's economic recovery and security in a post-pandemic world depends on our ability to lead in fifth-generation wireless technologies, or 5G.

Every day I see this technology advancing and the innovation it can deliver growing. And every day I am reminded that we have more work to do before the benefits of this service can reach everyone, everywhere.

That might sound like a lofty goal, but I am an optimist. While we may disagree on some details from time to time, I know that each one of my colleagues at the Federal Communications Commission is equally committed to ensuring that the United States leads in 5G. I welcome their ideas, their resolve, and their partnership, and I look forward to building this future for the benefit of the American people.

Back to the here and now. Most of the country has yet to experience the benefits of a true 5G network. The out-there innovations it can deliver are still a ways off because so many of them are not about connectivity delivered via phones. Plus, for so many consumers, the present is confusing, with carriers providing different versions of 5G, which can sometimes feel a lot like the 4G they already have. In part, this is due to the fact that carriers don't always have the airwaves they need to provide consistent and widespread coverage at this time.

Today we take action to change that. We take action that will move us closer to 5G service that is fast, secure, resilient, and—most importantly—available everywhere in the country. We accomplish that by adopting rules and auction procedures that will make available 100 megahertz of prime mid-band spectrum in the 3.45-3.55 GHz band available for 5G this year. This offers real opportunity because during the past few years the United States was slow, relative to other countries, to recognize the importance of mid-band spectrum for 5G. This meant we were late to bring these airwaves to market. So mid-band spectrum has been the critical component that is missing and our action here helps fix that.

Of course, our actions today are about much more than just spectrum. They're also about how we advance new network technology to build a better future. So rather than just extending the same-old, same-old policies of the past, we are doing some things differently.

First, today's decision includes the most aggressive build-out obligations of any spectrum auctioned for 5G to date. As a result, we insist on getting infrastructure built *twice as fast* as what the agency has required in other recent 5G bands.

Second, today's decision commits to the idea that successful auctions have many bidders. To understand why this is important, take the FCC's recent C-Band auction. More than 90 percent of the 5,684 licenses that were available in that auction were won by the top two bidders. So here we take steps to increase the range of actors willing to participate in our auctions. We do this by adopting a pre-auction spectrum aggregation limit that will expand opportunity for service providers in every market in the United States. In addition, thanks to the leadership of my colleague, Commissioner Starks, we will auction this spectrum in smaller blocks in order to encourage broader participation from smaller providers and create more opportunities to win licenses.

Third, today's decision thinks about this band in a coordinated way, so we don't end up increasing interference and decreasing the utility of the limited mid-band resources we have available to us. We do that by adopting rules that will ensure that the higher power users in the 3.45 GHz band do not undermine the considerable investments that have been made in the adjacent CBRS band. And while in the past different parts of our government have pulled in different directions when it comes to spectrum policy, here we have worked closely with our federal partners at the National Telecommunications and Information Administration and the Department of Defense to ensure a whole-of-government approach.

Most importantly, the path we lay out today is the one that ensures that we will meet the requirement from Congress in last year's appropriations law that we work with our federal partners to bring the 3.45 GHz band to auction by the end of this year. It is also the path required to meet as our obligations under the Commercial Spectrum Enhancement Act that our auction recover 110 percent of the Congressionally-approved relocation costs for this band—which stand at roughly \$15 billion.

So think of today's decision as a spectrum stimulus for 5G. It will boost the economy and encourage investment in our 5G future.

That's progress we can be proud of. But we are not slowing down here. I have begun to work with our federal partners to look at the next tranche of mid-band spectrum in the 3.1-3.45 GHz band. And while the law compelled certain outcomes in our decision today, it is my hope that our future efforts to find more spectrum for 5G will enjoy the flexibility to explore every option available to us, including the opportunity to pursue more innovative spectrum sharing policies like we have in the CBRS band. I also have instructed the Wireless Telecommunications Bureau to consider opportunities to rationalize the entire 3 GHz band to increase efficiency while also being mindful of the importance of unlicensed use.

Thank you to those at the agency who worked on these items. There are too many of you to name, but it includes staff from the Wireless Telecommunications Bureau, the Office of Economics and Analytics, the Office of Engineering and Technology, the Enforcement Bureau, the Office of General Counsel, the Office of the Managing Director, and last but not least, the Office of Communications Business Opportunities.

**STATEMENT OF
COMMISSIONER BRENDAN CARR
APPROVING IN PART AND CONCURRING IN PART**

Re: *Facilitating Shared Use in the 3100-3550 MHz Band*, WT Docket No. 19-348

Securing U.S. leadership in 5G is one of the great success stories of the past four years. Now in hindsight, this may seem like a forgone conclusion. Of course America would lead the way. Yet back in 2016, we were at serious risk of ceding U.S. leadership in 5G to our overseas competitors. We were in jeopardy of losing the good-paying jobs and the economic growth that come with a first mover advantage.

Back then, the experts and analysts were not painting a rosy picture of America's 5G future, to put it mildly. And the facts on the ground certainly supported their predictions. On the spectrum side, the U.S. ranked far behind China, the U.K., South Korea, Japan, Germany, and many other nations in spectrum availability.

So we went to work and put a plan in place to turn things around.

We knew that 5G would be delivered over every spectrum band. So we pursued an all-of-the-above strategy that emphasized low, mid, and high band spectrum. On mid-band in particular, the U.S. had very clearly fallen behind. In 2017, when leadership changed at the FCC, the agency had no mid-band spectrum for 5G at a point in time when other countries had 300 MHz or more. And we had none in the pipeline either. So we put in the legwork to correct this mistake, and that effort paid off.

We held the first auction of mid-band spectrum in 2020 with 70 MHz worth of spectrum in the 3.5 GHz band. At 2.5 GHz, we transformed the rules governing nearly 200 MHz worth of this mid-band spectrum to support 5G builds and teed up over 100 MHz for auction. At 4.9 GHz, we modernized the regulation of a 50 MHz swath of spectrum. In the L Band, we authorized 30 MHz of spectrum for 5G and IoT. At 5.9 GHz, we opened up 45 megahertz for unlicensed. Plus, we pushed out an additional 1,200 MHz for unlicensed in the 6 GHz band. And let's not forget the C Band, where we cleared 280 MHz of sought-after mid-band spectrum.

All told, our spectrum efforts over the past four years opened up more than six gigahertz of spectrum for licensed 5G services in addition to thousands of megahertz of unlicensed spectrum.

These were not all walks in the park. In many cases, these were spectrum bands that prior FCCs took a pass on. Not because the bands were unsuited for next-gen wireless services, but because moving forward meant taking political heat for doing the right thing. Thankfully, the FCC took these fights head on over the past few years, and we freed up the spectrum needed to power 5G. As a result, the U.S. now has the strongest 5G platform in the world.

That brings me to today's Order and this additional, 100 MHz of prime, mid-band spectrum in the 3.45 GHz band. In 2018, we worked closely with NTIA and studied the opportunities for freeing up additional spectrum in the lower 3 GHz band. Those efforts enabled us to identify this large swath of spectrum as the most suitable for 5G on an expedited basis. Flash forward to 2019, and we launched the rulemaking that paved the way for today's vote and an auction this year—making this by far the fastest effort ever to identify and auction federal spectrum for commercial use.

I was pleased that Acting Chairwoman Rosenworcel included a number of important policy cuts in the draft decision that she circulated last month. For instance, by moving forward with full power operations, we align our approach with the successful auction of C Band spectrum. This will not only

create efficiencies between operations in the two bands, it will ensure robust 5G coverage, which is particularly helpful for accelerated builds in rural communities.

In addition to the power levels, there is a lot we get right today, including our decision to license spectrum over geographic areas that line up with our approach in C Band and that are well-suited for macro operations. So I want to thank the Chair and her team for their work on today's decision.

At the same time, I would have preferred for our Order to take a different approach in at least two areas.

First, I think we should have maximized participation in the auction, rather than adopting an upfront spectrum aggregation limit of 40 MHz. Studies of bidding restrictions imposed by regulators around the world show that these efforts routinely fail to achieve those governments' goals of determining winners and losers of spectrum auctions—and they often impose severe costs along the way in the form of reduced auction revenues, fallow spectrum, and delayed builds. The FCC itself does not have a great track record when it comes to predicting who will show up at an auction and how much they will bid. To be sure, industry may want the government to limit competition and divvy up the market through these types of mechanisms, but particularly given the aggregate reserve price of over \$14 billion for this auction, I think we should have refrained from doing so and instead maximized the chances for a successful auction.

Second, I would have preferred for the FCC to avoid imposing the costs associated with the bespoke out of band emissions mask we adopt for this 3.45 GHz band. We didn't impose this type of two-step limit in the C Band or the adjacent 3.55 GHz band, and the approach taken here will undoubtedly increase the costs of obtaining equipment and building out this spectrum. It also puts the U.S. on an island, since other countries have not taken this approach. So we're losing the efficiencies that come with international harmonization. On top of that, the Order's reasoning for imposing this obligation is thin, to say the least. That said, I am pleased that the Chair's office worked with my team to add language ensuring that the FCC will continue to engage industry and government stakeholders on this issue, and that we are not locking in a precedent for double masks in other parts of the lower 3 GHz band.

Given the good-faith progress we made to find common ground on this item and improve the outcome, I am concurring on these two issues while approving of the rest of today's decision.

Of course, our work does not end with this vote today. With all the effort we've put in over the past four years, we now have a lot of spectrum in the pipeline. The key is to make sure we get those airwaves out into the commercial marketplace as quickly as possible. So earlier this week, I offered up a spectrum calendar to make sure we stay on track and, hopefully, provide stakeholders with the information they need to plan for the agencies' future spectrum auctions. Here is what I proposed:

In 2021, we should take the following actions:

- 3.45 GHz
 - Hold Auction 110 for the 100 MHz of spectrum in the 3.45 GHz band as required by Congress at power levels that will support 5G builds. The good news is that today's decision does just that.

- 2.5 GHz
 - Hold Auction 108 for the 100+ MHz of spectrum in the 2.5 GHz band. This is prime, mid-band spectrum that needs to get to market ASAP using the FCC's tried and true mechanisms. We've already put the legwork in to get this across the finish line later this year by releasing the comment Public Notice in January.

- 6 GHz
 - We should adopt an order this year that permits very low power (VLP) devices to operate in the 6 GHz band at 14 dBm. I have talked about this as a key step to promoting 5G in this country because it would help power the AR/VR and other applications that will drive consumer demand for 5G devices. We have a pending Further Notice that would allow us to go right to an order on this and doing so would align the U.S. with the approach taken in this band abroad, including in Brazil.

 - We should also allow client-to-client device communications in this band, which we sought comment on in a January 2021 Public Notice and would increase efficiency and enable even more innovative uses of this spectrum.

- 3.5 GHz
 - We should seek comment this year on increasing the power levels for CBRS operations in the 3.5 GHz band. Upping the power levels here would help align the U.S. band plan with international standards and create efficiencies for mid-band 5G builds in the U.S. that could span the 3.45 GHz to C Band spectrum ranges. We should take the real-world experiences we're gaining with CBRS builds and coordinate with federal users as we look at increasing the power levels here. Getting this done will help extend the reach of 5G services to even more Americans.

- U-NII-2C (5470-5725 MHz)
 - Okay, this one may seem like it is coming from left field. So stay with me. We should start a proceeding to look at updating the rules that apply to the U-NII-2C band (5470-5725 MHz). This band contains a large, 255 megahertz-wide swath of unlicensed spectrum that is vastly underutilized today—indeed, equipment manufacturers don't even bother to include the band in many 5 GHz Wi-Fi devices. This is because we have costly and cumbersome technical restraints on the band that are designed to protect federal operations. We should examine whether advances in technology would allow us to continue to protect federal through a more efficient mechanism, thus creating more opportunities for unlicensed use of this band.

- FCC's Auction authority
 - Finally, we should work with Congress this year to ensure that it reauthorizes the FCC's spectrum auction authority, which expires for most bands at the end of fiscal year 2022.

We can and should get all of that done in 2021 and doing so would match the pace we've been moving on spectrum over the past few years.

Then, in 2022, here's what should be at the top of our list:

- 1300-1350 MHz.
 - Hold an auction for the 50 MHz of spectrum between 1300-1350 MHz. This spectrum was first identified as a target for clearing all the way back in 2015. And last year, the FCC began working with NTIA on a plan that would enable the current federal incumbents to vacate the band for auction as soon as next year.

- Millimeter wave
 - Hold another auction of millimeter wave spectrum. And the 42 GHz band looks to be one of the prime candidates for action next year.

After 2022, there will be more spectrum bands that we can get across the finish line.

- Lower 3 GHz
 - The FCC has been working with federal stakeholders to create additional opportunities for commercial providers below the 3.45 GHz band. The FCC has already relocated most of the secondary non-federal users out of the band to facilitate this move. And momentum is building towards making more 5G available in this band sooner rather than later thanks to lessons learned during the AMBIT initiative. There are challenges that remain given the presence of some high-power systems, but we are well positioned to work through those issues this year and move forward with an auction of Lower 3 GHz spectrum after 2022.

- 4.8 GHz
 - We should also auction spectrum in the 4.8 GHz band after 2022. This is a particularly important band from an international perspective because a number of countries have moved ahead of us by licensing this spectrum exclusively for 5G. While there are many federal point-to-point links in this band, we have the time to open this band up for 5G in the next couple of years.

- 7.125-8.4 GHz
 - Following a 2018 directive, federal agencies have been collecting information about their operations in this band with a report due back to NTIA. With some additional legwork this year and next, we will be well positioned to reallocate portions of this band for commercial 5G operations.

- Above 95 GHz
 - We took initial steps towards opening up the spectrum horizons above 95 GHz back in 2019. And the terahertz bands in that range could prove useful over time for short-range applications, including potential 6G applications. So we should look to take additional steps in those bands in the coming years.

So the good news is that we have plenty in the spectrum pipeline. It's on us at the FCC to make sure we stick to this schedule and get it into the market. Of course, we will need to pair those airwaves with more action on the infrastructure front. This includes finishing targeted broadband maps this fall, not next year, so that we can unlock funding through RDOF II and the 5G Fund that is needed to close the digital divide.

Speaking of sticking to an aggressive schedule, I would like to thank the staff in the Wireless Telecommunications Bureau, Office of Economics and Analytics, and Office of Engineering and Technology for their tireless efforts to keep this proceeding moving. I approve in part and concur in part.

**STATEMENT OF
COMMISSIONER GEOFFREY STARKS**

Re: *Facilitating Shared Use in the 3100-3550 MHz Band*, WT Docket No. 19-348

In the age of the smartphone, demand for wireless service continues to grow at an exponential pace. 5G and the applications stemming from it are changing the way we work, protecting our health and safety, and creating new opportunities for communication, education, and entertainment. While consumer demand for mobile wireless service has played a central role in that growth, there are other factors driving growth as well—like the city installing routers on its buses to provide free Wi-Fi to passengers, the business placing sensors throughout its facilities to track its inventory, or the rural school district tapping into unused spectrum so that its students can learn remotely.

Mid-band spectrum is critical to that future, and I'm pleased that today's Report & Order will make another 100 megahertz of this spectrum available for 5G and other advanced wireless services. Unrestricted access to the 3.45 GHz band will both accelerate U.S. leadership in next-generation wireless networks and harmonize the U.S. band with international 5G use. Robust, full-power 5G deployment using mid-band spectrum can also help address internet inequality problems by providing high-quality connections to people who live outside the most densely populated urban centers.

The results of the recent C-Band auction demonstrate the ample demand for this spectrum. That auction raised over \$80 billion and affirmed my insistence that the proceeds go to the American taxpayer, rather than foreign satellite operators. I'm happy about the C-Band auction's financial success. I'm hopeful that the 3.45 GHz auction will both raise substantial funds and generate a significantly diverse group of winners. Thus, I appreciate that my colleagues agreed with my request to reduce the size of the spectrum blocks in the band to 10 megahertz. This change – coupled with the 40 megahertz spectrum aggregation limit – should increase competition, encourage more efficient bidding, and create opportunities for smaller bidders, particularly the rural and regional carriers that are critical to bringing advanced services to our hardest-to-reach communities.

I'm also grateful that the Report & Order includes measures to protect other licensees from harmful interference. For example, the item's out-of-band emissions limits and good-faith negotiation requirement for TDD synchronization should protect operations in the adjacent CBRS band. I will be observing those negotiations closely, as well as the cooperation efforts between commercial licensees and the Department of Defense contractors who currently operate in this band under part 5 experimental licenses.

Overall, the draft strikes a reasonable balance given the statutory language in the Beat CHINA for 5G Act, which requires that we commence this auction before the end of the year and affirms the existing requirement that we must raise 110 percent of the federal government's relocation or sharing costs. Without those restrictions, I would have given greater consideration to opportunistic use in the band, which could have amplified and reinforced the innovative benefits of the 3.45 GHz band. As we have seen in the CBRS band, opportunistic use facilitates more intensive spectrum use by allowing smaller entities to benefit from unused spectrum in a quick and cost-effective manner, particularly in rural areas that are often the last to see licensed deployments. Nevertheless, I'm pleased that my colleagues agreed to include language highlighting the benefits of opportunistic use, and I hope to see consideration of this approach in future spectrum proceedings.

I recognize that Commission staff faced difficult restrictions in drafting this Report & Order, and I want to acknowledge and applaud their hard work on this proceeding. I will vote to approve this item

and its companion Public Notice, and look forward to building on its efforts to provide opportunities for small and rural licensees in the 3 GHz band and elsewhere.

Thank you to the staff in the Wireless Telecommunications Bureau and the Office of Engineering and Technology for their work on this item.

**STATEMENT OF
COMMISSIONER NATHAN SIMINGTON
APPROVING IN PART, CONCURRING IN PART**

Re: *Facilitating Shared Use in the 3100-3550 MHz Band*, WT Docket No. 19-348

Today's Order begins the critical and expeditious implementation of the Beat CHINA for 5G Act of 2020, which requires the Commission to start a 3.45 GHz band auction by December 31, 2021. In addition to putting into place rules that will enable the Commission to beat that deadline, we also advance the ultimate goal of the legislation: to free more spectrum for U.S. deployment of advanced services. Under the leadership of Acting Chairwoman Rosenworcel, we continue to ensure that America remains a leader in the deployment of advanced networks and that it is poised to harness next generation technologies. With thanks to the invaluable coordination of the NTIA and our other Executive Branch partners, the Commission's actions today will enable industry to exploit an additional 100 megahertz of valuable mid-band spectrum for innovative uses.

The Commission strikes a good balance among competing industry objectives to allow for a numerous and diverse set of potential 3.45 GHz auction participants. This Order preserves the model of high-power exclusive flexible use. However, it also protects existing licensees in the neighboring CBRS band and federal incumbents who require relocation. Finally, it provides the opportunity for numerous smaller providers to participate in the auction and to innovate and flourish in the mobile marketplace.

While I support the item overall, I would be remiss to not acknowledge some reservations about portions of our decision today. I admire the care, diligence, and cooperation of the FCC, NTIA and industry that went into crafting the two-step out-of-band emissions (OOBE) limit. However, I am concerned that, though presently necessary to protect critical federal operations in the band considering present band engineering, this requirement, together with the expedited deployment timelines and a reserve price of over \$14 billion, could dampen potential investment and threaten the auction's success. Potential auction participants have expressed concerns that costs and delays associated with the development of the 3.45 GHz-specific radios required to accommodate the two-step limit could deter participation. The development of new radios for this band will also likely slow deployment for providers who become licensees. Further, the two-step out-of-band emissions approach creates a standard unique only to the 3.45 to 3.55 GHz portion of the band, making it more difficult to achieve holistic international harmonization of the 3 GHz band, which is critical to U.S. 5G competitiveness. While accepting present band engineering as a necessary compromise to timely bring this band to market, I would encourage the Commission to revisit the OOBE limit in the future.

I also fear that our decision to provide relocation reimbursement to secondary radiolocation licensees could have unintended and unwelcome consequences. While the licensees at issue no doubt operate valuable radar systems, the Commission may be unable to make distinctions about future secondary licensees who request the same treatment, but at a much higher price tag. This threatens to further raise the price of relocation in future auctions.

Despite these concerns, I approve in part and concur in part. I also express tremendous gratitude to Commission staff who diligently worked on this item.