

FACT SHEET*

Facilitating 5G in the 3.45-3.55 GHz Band

Report and Order and Further Notice of Proposed Rulemaking - WT Docket No. 19-348

Background: The Commission has acted quickly in recent years to meet the growing demand for mid-band spectrum for 5G. Last month, the FCC concluded an auction of 70 megahertz of Priority Access Licenses in the 3.5 GHz band, and on December 8, the Commission will begin an auction of 280 megahertz of spectrum in the 3.7 GHz band in the adjacent C-band.

In the MOBILE NOW Act, Congress directed the Commission to identify spectrum for new mobile and fixed wireless broadband use, and to work with the National Telecommunications and Information Administration to evaluate whether commercial wireless services and federal incumbents could share use of spectrum between 3.1 and 3.55 GHz. In December 2019, the Commission adopted a Notice of Proposed Rulemaking proposing to remove the non-federal allocations from the 3.3-3.55 GHz band and seeking comment on relocating incumbent non-federal operations out of the band, in order to prepare it for possible commercial use. Last month, the White House and the Department of Defense announced plans to allow for commercial 5G systems to operate in the 3.45-3.55 GHz band throughout almost all of the contiguous U.S.

What the Order Would Do:

- Eliminate the non-federal radiolocation service allocation in the 3.3-3.55 GHz band and the non-federal amateur allocation in the 3.3-3.5 GHz band but allow incumbent licensees to continue operating in the 3.45-3.55 GHz band until a future date;
- Relocate non-federal radiolocation licensees to the 2.9-3.0 GHz band, allowing them to continue operating on a secondary basis to federal operations, consistent with current allocations; and
- Allow amateur licensees to individually determine appropriate alternate spectrum from existing available spectrum allocations.

What the Further Notice Would Do:

- Propose to make 100 megahertz of spectrum in the 3.45-3.55 GHz band available for flexible use wireless services, including 5G, throughout the contiguous United States;
- Propose to add a co-primary, non-federal fixed and mobile (except aeronautical mobile) allocation to the band;
- Seek comment on an appropriate regime to coordinate non-federal and federal use;
- Propose a band plan and technical, licensing, and competitive bidding rules for the band;
- Seek comment on how to relocate non-federal radiolocation operators to the 2.9-3.0 GHz band; and
- Seek comment on the process for sunseting amateur use in the 3.3-3.5 GHz band.

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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

REPORT AND ORDER AND FURTHER NOTICE OF PROPOSED RULEMAKING*

Adopted: []

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By the Commission:

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TABLE OF CONTENTS

Heading Paragraph #
I. INTRODUCTION..... 1
II. BACKGROUND..... 4
III. REPORT AND ORDER 18
A. Clearing the 3.3-3.55 GHz Band of Secondary, Non-Federal Allocations 21
B. Relocation of Secondary, Non-Federal Radiolocation Operations 26
C. Sunset of Secondary Amateur Allocation 31
IV. FURTHER NOTICE OF PROPOSED RULEMAKING 36
A. Reallocating the 3.45-3.55 GHz Band for Commercial Wireless Use..... 38
B. Future of Federal Incumbent Use in the 3.45-3.55 GHz Band 42
C. 3.45-3.55 GHz Band Plan 51
D. Relocation of Secondary Non-Federal Radiolocation Operations 56
E. Continued Operation of Amateur Stations in Part of the 3.3-3.45 GHz Band..... 64
F. Technical Issues 69
G. Licensing and Operating Rules; Regulatory Issues 87
H. Competitive Bidding Procedures 105
V. PROCEDURAL MATTERS 108
VI. ORDERING CLAUSES 117

* This document has been circulated for tentative consideration by the Commission at its September 30, 2020 open meeting. The issues referenced in this document and the Commission’s ultimate resolution of those issues remain under consideration and subject to change. This document does not constitute any official action by the Commission. However, the Chairman has determined that, in the interest of promoting the public’s ability to understand the nature and scope of issues under consideration, the public interest would be served by making this document publicly available. The FCC’s ex parte rules apply and presentations are subject to “permit-but-disclose” ex parte rules. See, e.g., 47 C.F.R. §§ 1.1206, 1.1200(a). Participants in this proceeding should familiarize themselves with the Commission’s ex parte rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission’s meeting. See 47 CFR §§ 1.1200(a), 1.1203.

APPENDIX A—Final Rules

APPENDIX B—Final Regulatory Flexibility Analysis

APPENDIX C—List of Commenters

APPENDIX D—Proposed Rules

APPENDIX E—Initial Regulatory Flexibility Analysis

I. INTRODUCTION

1. With this Report and Order and Further Notice of Proposed Rulemaking, we continue to execute our comprehensive strategy to Facilitate America's Superiority in 5G Technology (the 5G FAST Plan).¹ Earlier this year, we adopted rules to bring to market 280 megahertz of spectrum for flexible use in the 3.7 GHz band, with an auction scheduled before the end of 2020.² With respect to the Citizens Broadband Radio Service in the 3.5 GHz band, commercial deployments for General Authorized Access spectrum across the full 150 megahertz began in early 2020. And this summer, the Commission successfully auctioned 70 megahertz of the 3.5 GHz Priority Access Licenses.³

2. Now, we build on these efforts to unleash additional much-needed mid-band spectrum for flexible use, turning our focus to 3100-3550 MHz. The National Telecommunications and Information Administration (NTIA) identified the 3450-3550 MHz spectrum band as a potential candidate for shared use between federal incumbents and commercial services two years ago.⁴ In June 2020, pursuant to its obligations under the Commercial Spectrum Enhancement Act,⁵ the Commission notified the NTIA of its plan to commence an auction in December 2021 for licenses in 100 megahertz of the 3400-3550 MHz band.

3. 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 presents an opportunity to make a large contiguous block of mid-band spectrum available for commercial use. Collectively, the 3.45-3.55 GHz band and neighboring 3.5 GHz and 3.7 GHz bands could offer 530 megahertz of mid-band spectrum for flexible use. The Department of Defense (DoD) recently announced that it has devised a spectrum sharing framework for the 3.45-3.55 GHz band and intends to conclude the additional work necessary to make this spectrum available for future Commission auction. Now is the time to prepare the band for such future use and to consider how best to license future flexible use licenses in this segment of the lower 3 GHz band.

4. In the Report and Order, we adopt the Commission's 2019 proposal to remove the secondary, non-federal allocations from the 3.3-3.55 GHz band as a first step toward future sharing between federal incumbents and commercial operations. In the Further Notice of Proposed Rulemaking (Further Notice), we propose allocation changes to this band to enable future commercial use; coordination between future commercial users and federal incumbents that remain in the band; relocation logistics for non-federal secondary users; and 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. We expect that our action today, in tandem with continued work by the DoD and other

¹ FCC, *The FCC's 5G Fast Plan*, <https://www.fcc.gov/5G> (last visited Sept. 7, 2020).

² *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*).

³ *Auction of Priority Access Licenses in the 3550-3650 MHz Band Closes; Winning Bidders Announced for Auction 105*, AU Docket No. 19-244, Public Notice, DA 20-1009 (WTB Sept. 2, 2020).

⁴ David J. Redl, NTIA Identifies 3450-3550 MHz for Study as Potential Band for Wireless Broadband Use (Feb. 26, 2018), <https://www.ntia.doc.gov/blog/2018/ntia-identifies3450-3550-mhz-study-potential-band-wireless-broadband-use>.

⁵ 47 U.S.C. § 923(g)(1)-(2), (4).

federal partners, will allow for agencies to file transition plans no later than April 2021, and for commercial operations to begin in early 2022.

II. BACKGROUND

5. The lower 3 GHz band—and the 3450 MHz to 3550 MHz portion of the band (3.45-3.55 GHz band) in particular—has been targeted as spectrum to support 5G both here and abroad, and assessed within the federal government, across the legislative and executive branches, as well as within the Commission.

6. Congress addressed the pressing need for spectrum 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.⁶ The MOBILE NOW Act mandated that the Secretary of Commerce, working through NTIA: (1) submit, in consultation with the Commission, a report by March 23, 2020, on the feasibility of “allowing commercial wireless service, licensed or unlicensed, to share use of the frequencies between 3100 megahertz and 3550 megahertz,”⁷ 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, 2022.⁸

7. Shortly before Congress signed the 2018 omnibus spending bill, NTIA announced that it had identified the 3.45-3.55 GHz band for study for potential repurposing to spur commercial wireless innovation.⁹ 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,¹⁰ on the feasibility of sharing in the entire 3.1-3.55 GHz band.¹¹ NTIA released this feasibility study in January 2020, in which it found that, while commercial operations would

⁶ 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 VI (the Making Opportunities for Broadband Investment and Limiting Excessive and Needless Obstacles to Wireless Act or MOBILE NOW Act).

⁷ MOBILE NOW Act § 605(a).

⁸ *Id.* § 603(a)(1).

⁹ The 3100-3500 MHz band was initially identified as a potential band for spectrum sharing in NTIA's Ten Year Plan, see 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 https://www.ntia.gov/files/ntia/publications/ntia_quant_assessment_report-no_appendices.pdf. David J. Redl, NTIA Identifies 3450-3550 MHz for Study as Potential Band for Wireless Broadband Use (Feb. 26, 2018) <https://www.ntia.doc.gov/blog/2018/ntia-identifies-3450-3550-mhz-study-potential-band-wireless-broadband-use>, see also NTIA's Ten Year Plan, https://www.ntia.doc.gov/files/ntia/publications/tenyearplan_11152010.pdf, and Quantitative Assessment, https://www.ntia.gov/files/ntia/publications/ntia_quant_assessment_report-no_appendices.pdf.

¹⁰ *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 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.”).

¹¹ See U.S. Dept. of Commerce, Annual Report on the Status of Spectrum Repurposing at 20 (Aug. 2019), <https://go.usa.gov/xparp>.

impact incumbent federal systems, spectrum sharing that provides both sufficient protection to incumbent operations and attractive opportunities for commercial business is possible, subject to further analysis.¹²

8. In April 2020, NTIA's research laboratory, the Institute for Telecommunications Sciences, published a summary report that presents data collected from a two-year effort to measure spectrum occupancy in the 3450-3650 MHz range at four coastal sites.¹³ Two of the sites have significant military presence and two do not. Sensors used were optimized to collect on the SPN-43 air-marshalling radar and were not optimal for collecting other federal systems.¹⁴ According to NTIA, understanding how often federal systems use these frequencies is critical for ensuring that spectrum sharing with commercial services can function as intended.¹⁵ At the locations with military presence, the measured occupancy of the 3450-3550 MHz band varied from 9% to 25% on an annualized basis. At the sites without significant military presence, occupancy averaged below 1%.¹⁶ According to NTIA, "the sensor design (e.g., antenna selection, detection scheme) and installation (e.g., location, antenna configuration) are designed for detecting the SPN-43 air-marshalling radar that operates at 3.5-3.65 GHz and is a primary emitter in this band."¹⁷

9. As directed by the MOBILE NOW Act, NTIA in July 2020 submitted a report to Congress, which continued to examine the shared use of spectrum between federal incumbents and commercial wireless services in the 3.1-3.55 GHz band under the assumption of no changes to incumbent operations.¹⁸ The report concluded that the 3.45-3.55 GHz band "is a good candidate for potential spectrum sharing, including at the commercial system power levels sought by the wireless industry."¹⁹ The report further concluded that some sharing below 3450 MHz might be possible, but additional analysis of the entire band would be necessary to assess the various sharing mechanisms and whether incumbent relocation of operations below 3450 MHz is possible.²⁰ 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 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.²¹

¹² Edward Dorcella *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>.

¹³ Michael Cotton *et al.*, 3.45–3.65 GHz Spectrum Occupancy from Long-Term Measurements in 2018 and 2019 at Four Coastal Sites, NTIA Report 20-548 (Apr. 2020) (NTIA April 2020 Report), <https://www.its.bldrdoc.gov/publications/details.aspx?pub=3243>,

¹⁴ NTIA April 2020 Report at 2.

¹⁵ NTIA Press Release, *NTIA Releases Spectrum Occupancy Data to Help Enable Successful Sharing in the Mid-Band*, Apr. 23, 2020, <https://www.ntia.gov/blog/2020/ntia-releases-spectrum-occupancy-data-help-enable-successful-sharing-mid-band> (NTIA April 2020 Press Release).

¹⁶ NTIA April 2020 Report at 10.

¹⁷ *Id.* at 13 (specifying that "[t]here are other important ground-based, shipborne, and airborne government systems that operate in this frequency range. This approach is not necessarily optimal for detecting all 3.5 GHz government systems.").

¹⁸ 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.

¹⁹ *Id.*

²⁰ *Id.*

²¹ *Id.* at 10-11.

10. In light of the MOBILE NOW Act's directive and NTIA's ongoing study of the band for sharing, the Wireless Telecommunications Bureau in February 2019 imposed a freeze on accepting and processing applications for new or expanded part 90 Radiolocation Service operations in the 3.1-3.55 GHz band.²² The freeze was implemented to "maintain a stable spectral environment in a band that is under active consideration for possible alternative use."²³

11. In December 2019, the Commission adopted a *Notice of Proposed Rulemaking* that proposed 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.²⁴ It also sought comment on what alternative spectrum would be available for those 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.²⁵ A large number of stakeholders filed comments supporting our proposal to remove the non-federal secondary allocations and operations from at least the upper portion of the 3.1-3.55 GHz band, including the radiolocation services licensees whose operations would be impacted.²⁶ Many commenters also support removing the allocations from the lower portion of the band.²⁷ Several amateur radio operators oppose the removal of the secondary amateur allocation from the band.²⁸

12. In 2020, the White House and the DoD formed America's Mid-Band Initiative Team (AMBIT) with the goal of making 100 megahertz of contiguous mid-band spectrum available in the 3.45-3.55 GHz band for full commercial use.²⁹ Under the agreement that was reached as part of the AMBIT study process, the DoD expects to enable commercial 5G systems to operate at full power throughout

²² *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); see also Letter from Jeffrey E. Rummel, Attorney for Dynetics, Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 (filed Dec. 5, 2019) (renewing its requests for waiver and modification); Letter from Brett Kilbourne, Utilities Technology Council, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 (filed Dec. 5, 2019) (supporting Dynetics's requests); Letter from Jeffrey L. Sheldon, Counsel for Southern Company Services, Inc., to Marlene H. Dortch, Secretary, FCC, WT Docket No. 19-348 (filed Dec. 5, 2019) (same).

²³ *3.1-3.55 Freeze PN*, 34 FCC Rcd at 20.

²⁴ *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*).

²⁵ *3.1-3.55 GHz NPRM*, 34 FCC Rcd 12662.

²⁶ See, e.g., NBCUniversal Comments at 3; Nexstar Broadcasting Reply at 6. Parties that filed comments and reply comments in response to the *3.1-3.55 GHz NPRM* are listed in Appendix C.

²⁷ See, e.g., 5G Americas Comments at 10; T-Mobile Comments at 2; Nokia Comments at 2-5.

²⁸ See, e.g., AMSAT Comments at 3; Rochester VHF Group Comments at 1; San Bernadino Microwave Society Comments at 3-6.

²⁹ See 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/>.

almost all the contiguous United States³⁰ by (1) adjusting its concept of operations within the band; (2) coordinating networking 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 capability which operates outside the band. The DoD would also require access to the spectrum during times of national emergency.

13. There has also 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 fixed and mobile use in all three ITU regions.³¹ 3GPP, the global industry standards organization that develops standards and protocols for mobile technology that are widely adopted by industry, has specified two spectrum operating bands for 5G that overlap with the band: band n77 between 3.3-4.2 GHz, and band n78 between 3.3-3.8 GHz.³² In addition, the Radio Spectrum Policy Group of the European Commission issued a mandate to the European Conference of Postal and Telecommunications Administrations that the 3.4-3.8 GHz band be the first primary band for 5G.³³ Further, it released a report that provides recommendations for updating the European regulatory framework for this band in support of introducing 5G wireless systems.³⁴ Our continued efforts to promote flexible use licensing in the band will help to promote international harmonization.

14. *Current Allocation and Use of the 3.1-3.55 GHz Band and Adjacent Bands.*—Currently, the entire 3.1-3.55 GHz band is allocated for both federal and non-federal radiolocation services, with non-federal users operating on a secondary basis to primary federal radiolocation services.³⁵ The federal radiolocation allocation is one piece of a broader federal primary allocation for radiolocation in the 2.9-3.65 GHz band.³⁶ The DoD operates high-powered defense radar systems on fixed, mobile, shipborne, and airborne platforms in this band.³⁷

³⁰ The final AMBIT study changed the geographic areas for commercial use from the continental United States (49 states and the District of Columbia) to the contiguous United States, which excludes Alaska, Hawaii, and US Territories.

³¹ 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).

³² 3GPP TS 38.104, NR; Base Station (BS) Radio Transmission and Reception. Note: 3GPP specifications refer to 5G as New Radio (NR).

³³ European Commission Directorate-General for Communications Networks, Content and Technology, Radio Spectrum Policy Group, Strategic Spectrum Roadmap Towards 5G for Europe: RSPG Second Opinion on 5G Networks at 2 (2018), https://circabc.europa.eu/sd/a/fe1a3338-b751-43e3-9ed8-a5632f051d1f/RSPG18-005final-2nd_opinion_on_5G.pdf; European Commission Directorate-General for Communications Networks, Content and Technology, Radio Spectrum Policy Group, Strategic Spectrum Roadmap Towards 5G for Europe: Progress Report of the RSPG Working Group on 5G (June 12, 2019), http://rspg-spectrum.eu/wp-content/uploads/2019/06/RSPG19-018final_progress_report-5G.pdf.

³⁴ See European Conference of Postal and Telecommunications Administrations, CEPT Report 67 (2019), <https://www.ecodocdb.dk/download/561367fd-1ac6/CEPT%20Report%2067.pdf>; European Conference of Postal and Telecommunications Administrations, CEPT Roadmap for 5G (March 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).

³⁵ See 47 CFR § 2.106 and US108; *id.* § 90.103(b), (c)(12).

³⁶ *Id.* § 2.106.

³⁷ 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

(continued....)

3.1-3.55 GHz Band Allocation

Federal	Radiolocation	Radiolocation	Radiolocation	
	Space Research		Aeronautical Radionavigation	
	Earth Exploration Satellite			
Non-Federal	Radiolocation	Radiolocation Amateur		
	Space Research		Radiolocation	
	Earth Exploration Satellite		Radiolocation	
	3.1 GHz	3.3 GHz	3.5 GHz	3.55 GHz

Primary
Secondary

15. From 3.1-3.3 GHz, the band is also allocated for federal and non-federal space research (active) and earth exploration satellite (active) in addition to radiolocation services.³⁸ 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.³⁹ Between 3.3 GHz and 3.55 GHz, there are only eight active non-federal radiolocation licenses, which are being used for a variety of commercial and industrial radiolocation services. For example, some licensees employ doppler radar to provide weather information to broadcast viewers; others provide security radar service to critical infrastructure entities.⁴⁰ Non-federal transmitters operating between 3.3-3.5 GHz are limited to survey operations and cannot exceed a peak power of 5 watts into the antenna.⁴¹ In addition, non-federal amateur services operate in the 3.3-3.5 GHz portion of the band pursuant to a secondary allocation and must not cause harmful interference to operations such as radio astronomy stations and stations authorized by other nations for radiolocation service.⁴² The 3.5-3.55 GHz portion of the band is also allocated for federal aeronautical radionavigation services.⁴³ In addition,

(Continued from previous page) _____
 (May 2000) (explaining why certain radar systems are in certain bands),
<https://www.ntia.doc.gov/report/2000/federal-radar-spectrum-requirements>.

³⁸ See 47 CFR § 2.106.

³⁹ Specifically, eight licenses are held by Alabama Power Company; seven licenses are held by Georgia Power Company; and two licenses are held by the city and county of Denver/Denver International Airport.

⁴⁰ Of the eight licenses, three are held by NBC Telemundo License LLC; one is held by Station Venture Operations, LP; one is held by I.O.U. Acquisitions; one is held by Air-Tel, LLC; one is held by Nexstar Broadcasting, Inc; and one is held by the Town of Warrensburg/Warrensburg Police Department. 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). This rulemaking is without prejudice to any enforcement proceeding.

⁴¹ See 47 CFR § 90.103(b), (c)(13).

⁴² 47 CFR §§ 2.106, 97.303(d), (f).

⁴³ See 47 CFR § 2.106.

the Radio Astronomy Service makes use of 3260-3267 MHz, 3332-3339 MHz, and 3345.8-3352.5 MHz.⁴⁴

16. 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).⁴⁵ These experimental licenses and STAs are issued pursuant to part 5 of the Commission's rules⁴⁶ and may be granted for a broad range of research and experimentation purposes, but experimental licenses and STAs must operate on a non-interference basis. If such a facility should cause interference, the operator is required to mitigate such interference up to and including discontinuing service.⁴⁷ Such part 5 experimental licenses and STAs are also subject to cancellation by the Commission at any time without notice or hearing if, in its discretion, the need for such action arises.⁴⁸ Many of the recurring STAs in the band enable short-term use of these or other frequencies to add additional capacity during sporting events.⁴⁹

17. The band immediately above 3.1-3.55 GHz is authorized 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 new 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.

18. The primary allocation for federal radiolocation operations continues below 3.1 GHz, with secondary non-federal radiolocation operations in this spectrum as well. Specifically, the 2.9-3.1 GHz band is a shared band that is allocated to the maritime radionavigation service and radiolocation services on a primary basis for federal use, the maritime radionavigation service on a primary basis for non-federal use, and the radiolocation service on a secondary basis for non-federal use.

III. REPORT AND ORDER

19. In the *Notice of Proposed Rulemaking*, the Commission proposed to eliminate the non-federal radiolocation service allocations in the 3.3-3.55 GHz band, as well as the non-federal amateur

⁴⁴ *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.

⁴⁵ The total number of active experimental authorizations is always changing. Experimental STAs, for example, may be requested for operation of a conventional experimental radio service station for a temporary period of no longer than six months. *See* 47 CFR §§ 5.54(a)(2), 5.61. A current list of 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>.

⁴⁶ These part 5 STAs are issued by the Office of Engineering and Technology under the Experimental Radio Service, 47 CFR § 5.61, as opposed to STAs issued by the Wireless Telecommunications Bureau pursuant to Wireless Radio Services rules, *see* 47 CFR §1.931.

⁴⁷ *See id.* §§ 5.3, 5.84.

⁴⁸ *Id.* § 5.83(b).

⁴⁹ *See, e.g.*, Aerial Video Systems Application for Special Temporary Authority, File No. 2361-EX-ST-2019 (filed Dec. 17, 2019) (requesting temporary use of the 3.3-3.4 GHz band within 30 km of TV City Los Angeles, CA, to utilize experimental RF video cameras in connection with the indoor production of video for televised entertainment events including the Golden Globe Awards, Grammy Awards, Academy Awards, Los Angeles Marathon, The Price is Right, The Voice, and Dancing With the Stars); Broadcast Sports International Application for Special Temporary Authority, File No. 0187-EX-ST-2020 (filed Feb. 4, 2020) (seeking an experimental STA to provide coordinated, temporary use of additional channels from 3401 MHz to 3418 MHz to provide sufficient video relay from RF cameras during the week of a PGA Tour event expected to be held at Bay Hill Club & Lodge, Orlando, FL in March 2020).

allocation in the 3.3-3.5 GHz band.⁵⁰ Both are secondary users of the band. We find that removing the existing secondary non-federal allocations from the 3.3-3.55 GHz band and clearing these non-federal operations from the band is in the public interest, and therefore we adopt this proposal. Because the DoD and NTIA agree that commercial users operating pursuant to flexible use licenses can be accommodated in the 3.45-3.55 GHz band at full power,⁵¹ and given continued interest in the 3.3-3.45 GHz band for future sharing for flexible use licenses, we find that retaining the secondary non-federal allocations across this spectrum would hinder the Commission's ability to offer flexible use licensing in the future and would undermine the intensive and efficient use of valuable mid-band spectrum. We will allow secondary non-federal licensees operating as of the effective date of this Report and Order to continue to operate in the 3.45-3.55 GHz band while the Commission finalizes plans to reallocate spectrum in the band. Authorization for these operations will sunset on a date consistent with the first possible grant of flexible use authorizations to new users in that portion of the band. We revise the Table of Allocations accordingly.⁵²

20. We determine that radiolocation licensees will be relocated from the 3.3-3.55 GHz band to the 2.9-3.0 GHz band, where they will have sufficient spectrum to continue to operate in the same way they currently do, on a secondary basis to federal operations, consistent with the current allocations in the band. We also find that amateur licensees have sufficient alternate spectrum bands for their operations, and we will allow these licensees individually to determine for themselves which of these alternative bands is best suited for their operations, rather than specifying a particular replacement spectrum band.

21. We also note that there are hundreds of experimental licenses, including experimental STAs, active throughout the 3.1-3.55 GHz band at any given time.⁵³ Going forward, these operations will be permitted here under the same limitations as they are in other bands licensed for flexible use—including that they must operate on a non-interference basis.

A. Clearing the 3.3-3.55 GHz Band of Secondary, Non-Federal Allocations

22. As we stated in the *Notice of Proposed Rulemaking*, “the Commission considers clearing spectrum for flexible use to be a priority when it is feasible to do so.”⁵⁴ Spectrum that has been cleared to the greatest extent possible provides maximum flexibility in future uses, ensuring intensive and efficient use of that spectrum going forward. Spectrum encumbrances, on the other hand, constrain the potential of future uses of that spectrum, deter investment in the band, and undermine the public interest benefits of the relicensing process. Given the ever-increasing demand for wireless spectrum for broadband access⁵⁵

⁵⁰ *3.1-3.55 GHz NPRM*, 34 FCC Rcd at 12665, para. 9.

⁵¹ NTIA July 2020 Report at 2.

⁵² Specifically, we add to footnote US108 of the Table of Allocations language clarifying that operations in this spectrum may continue until flexible use licenses may be issued for the 3.45-3.55 GHz band. *See* Appx. A, Final Rules.

⁵³ *3.1-3.55 GHz NPRM*, 34 FCC Rcd at 12664, para. 6. These licenses permit important research and experimentation, as well as provide short-term use of these frequencies for other purposes. *See also* Boeing Comments at 1 (noting that Boeing relies on experimental licenses in this band for critical aviation safety testing and certification, and asking the Commission to continue to allow such experimental uses); Lockheed Martin Comments at 2 (arguing that “without maintaining the current capability under experimental licensing in this band, U.S. radar manufacturers would be unable to perform testing needed as part of our research and development investigations and also unable to perform the testing required by our contracts to verify radar capabilities”).

⁵⁴ *3.1-3.55 GHz NPRM*, 34 FCC Rcd at 12665, para. 9.

⁵⁵ Ericsson predicts that total mobile traffic is expected to increase by a factor of five over the next six years, reaching 131 exabytes per month by the end of 2024. Ericsson further predicts that, in 2024, traffic generated by smartphones is projected to be 95% of total mobile data traffic and 5G networks will carry a quarter of all global mobile data traffic. *See* Ericsson, *Mobility Report* (2019), <https://www.ericsson.com/49d1d9/assets/local/mobilityreport/documents/2019/ericsson-mobility-report-june->

and the particular need for additional mid-band spectrum for those services,⁵⁶ we believe that such spectrum should be made available for exclusive, as opposed to shared, non-federal use where possible.

23. The Commission has broad authority under the Communications Act to modify its rules governing use of radio spectrum, and specific authority to allocate spectrum “so as to provide flexibility of use” provided such flexible use complies with international agreements, would be in the public interest, would not deter investment in communications services and systems and technological development, and would not result in harmful interference among users.⁵⁷ Under the Commission’s rules, secondary spectrum users cannot claim protection from primary operations, including those subsequently licensed by the Commission,⁵⁸ and they are subject to losing their spectrum rights if the primary operations in the band change at a later date.⁵⁹

24. From a technical perspective, we find that the removal of secondary, non-federal licensees from the 3.3-3.55 GHz band is necessary given the incompatibility of radiolocation and amateur operations with ubiquitous mobile and fixed broadband services, which are likely the primary uses pursuant to flexible use licenses. Existing federal use of this band is sporadic and geographically localized, which has created a spectral environment well-suited to the coexistence of radiolocation and amateur operations. By contrast, nationwide broadband services operate at all times in virtually all areas and would provide these secondary operations with little opportunity for meaningful, interference-free operations. Further, we expect that, if the incumbents were to try to maintain some degree of secondary operations, the dense and growing deployment of base stations providing wide area mobile services on a primary basis using all frequencies in the band would make such efforts on the part of secondary, co-channel systems too tenuous. Commenters agree that we should not permit continued secondary operations if flexible use licenses are to be used for 5G and other forms of nationwide wireless broadband.⁶⁰ For these reasons, we conclude that such secondary systems could not operate without creating significant interference risks both to their own operations and to primary flexible use services.

25. Clearing this band of encumbrances will ensure that it is used intensely and efficiently, create a spectral environment that will support wireless broadband operations, and promote commercial interest and investment in the band. Current non-federal secondary radiolocation uses—particularly high-power weather radar systems—are incompatible with the anticipated future use of the band, so our actions today are a necessary predicate to repurposing the 3.45-3.55 GHz band for flexible use services. Sunsetting the secondary non-federal allocations will prevent adjacent-channel issues and preserve the possibility of additional clearing for flexible use licensing below 3.45 GHz, furthering the public interest. While no decisions have yet been made for federal spectrum allocations below 3.45 GHz and further study is required prior to addressing the potential compatibility of non-federal flexible use operations with

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2019.pdf. Cisco estimates that, by 2022, 22% of global internet traffic will come from mobile networks, up from 12% in 2017. See Cisco Systems Inc., Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2017-2022 White Paper (2019), <https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-738429.html>.

⁵⁶ See *3.7 GHz Service Order*, 35 FCC Rcd at 2345-47, paras. 5-7.

⁵⁷ 47 U.S.C. § 303(y).

⁵⁸ 47 CFR § 2.104(d)(3).

⁵⁹ *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Report and Order, 29 FCC Rcd 6567 (2014) (displacing secondary licensees, including low power TV and TV translator stations, as part of the post-Incentive Auction repack).

⁶⁰ See CTIA Reply at 6-9 (urging the Commission to make clearing the band “its top priority” due to interference concerns); New America’s Open Technology Institute 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 Reply at 4-7 (opposing continued access for secondary incumbent operations after licensing for flexible use).

incumbent federal systems, deciding to relocate these non-federal users at this time will facilitate timely advance planning to accommodate the needs of all existing and future federal and non-federal users—a complex undertaking posing technical and financial issues that the Commission will need to work with relevant stakeholders to resolve. We anticipate that this action 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 spectrum for these secondary operations.

26. This decision notwithstanding, secondary non-federal radiolocation licensees and amateur license holders operating as of the effective date of this Report and Order may continue while the Commission finalizes plans to reallocate spectrum in the 3.45-3.55 GHz band. Authorization for these operations will sunset on a date consistent with the first possible grant of flexible use authorizations to new users in that portion of the band. For example, if we adopt a licensing scheme that will result in an auction to assign licenses, secondary use would sunset within 90 days of the close of the auction. We revise the Table of Allocations accordingly.⁶¹

B. Relocation of Secondary, Non-Federal Radiolocation Operations

27. Today, we remove the secondary, non-federal radiolocation allocation in the 3.3-3.55 GHz band. Secondary, non-federal radiolocation licensees operating as of the effective date of this Report and Order may, however, continue to operate in this band until authorization for such operations are sunset as described above.⁶² Radiolocation authorization will sunset on a date consistent with the first possible grant of flexible use authorizations to new users in that portion of the band (e.g., 90 days from the close of the auction if we adopt a licensing scheme that will result in an auction to assign licenses).⁶³

28. This action will ensure both that these radiolocation operations cease before new flexible use licenses are issued in the 3.45-3.55 GHz band and that radiolocation operators have enough notice to allow them to relocate without causing disruption to their services. In the accompanying Further Notice below, we seek comment on outstanding issues related to relocating these operations. Although spectrum above 3.45 GHz is the current focus for flexible use operations, we will not allow secondary non-federal radiolocation operations to continue in the spectrum between 3.3 GHz and 3.45 GHz. Rather, as we proposed in the *Notice of Proposed Rulemaking*, in order to prevent cross-service, adjacent channel interference to new operations and to prepare the band for future relicensing, all secondary radiolocation operations in the 3.3-3.55 GHz band will be required to relocate by a date certain that will be set by subsequent Commission action in this proceeding.

29. We find that relocating these operations to below 3.0 GHz, rather than to either the 3.1-3.3 GHz or 3.0-3.1 GHz bands, is the most efficient and appropriate approach given the existing radiolocation allocation and operations in spectrum below 3.0 GHz. We believe that spectrum below 3.0 GHz will allow radiolocation operators to provide the same S band (2-4 GHz) radar services as they do at 3.3-3.55 GHz. By moving their operations below 3.0 GHz, we prevent cross-service interference between radiolocation and future commercial wireless operations in the 3.45 GHz portion of the band and retain the potential for future flexible use licensing of the 3.1-3.3 GHz band.

30. Commenters currently holding these radiolocation licenses agree with relocation below 3.1 GHz, and no commenters object or offer any alternative means by which flexible use licensing could move forward in this band. NBCUniversal, for example, supports the Commission's efforts, including agreeing with the relocation of its Doppler weather radar operations.⁶⁴ Nexstar Broadcasting similarly

⁶¹ See Appx. A, Final Rules.

⁶² See *id.*

⁶³ We revise the Table of Allocations accordingly. See *id.*

⁶⁴ NBCUniversal Media Comments at 4-5.

supports our proposal to relocate its weather radar operations to alternate spectrum in the lower 3 GHz band.⁶⁵ Both NBCUniversal and Nexstar agree that relocating their operations to other S band spectrum will allow them to provide the same services as they do with their current spectrum.⁶⁶ Both of these licensees express concerns with being relocated to the 3.1-3.3 GHz band, however, given that this band could be considered for flexible use licensing in the future, and instead they propose the 3.0-3.1 GHz band as a preferable relocation destination for their operations.⁶⁷

31. Given the ongoing consideration of the entire 3.1-3.55 GHz band for future flexible use licenses, we agree with commenters that it is unwise to relocate secondary radiolocation operations to the lower portion of this band, i.e., 3.1-3.3 GHz. We also agree with commenters that identified spectrum below 3.1 GHz as a preferable location for these operations. In order to minimize adjacent channel interference to potential future flexible use licenses, however, we find that moving these operations to spectrum below 3.0 GHz is preferable to placing them in the 3.0-3.1 GHz band. Since the 2.9-3.0 GHz band already hosts non-federal radiolocation operations on a secondary basis, including the NEXRAD weather radar system operated by the National Weather Service,⁶⁸ the band should be able to accommodate these relocated operations without running the risk of causing adjacent channel interference to flexible use licenses. NBCUniversal agrees with this conclusion,⁶⁹ and no commenter disagrees. There is also no dispute in the record that existing equipment can be upgraded to support operations in this lower S band spectrum, which should reduce the expense and complexity involved in the relocation.⁷⁰

32. In relocating these operations, we will preserve their current 50-megahertz allocation and retain their secondary status. We decline to authorize additional changes to the Table of Allocations that some commenters propose, such as providing for a co-primary allocation for these radiolocation operations.⁷¹ Commenters seeking such changes have not sufficiently justified why they are necessary to ensure continuity of service for these operations. We conclude that such changes are unnecessary and would unduly limit other uses of spectrum and are therefore not in the public interest.

C. Sunset of Secondary Amateur Allocation

33. We adopt our proposal from the *Notice of Proposed Rulemaking* to remove the amateur allocation from the 3.3-3.5 GHz band. As we did with radiolocation operations, we adopt changes to our rules today that provide for the sunset of the secondary amateur allocation in the band, but allow continued use of the band for amateur operations, pending resolution of the issues raised in the Further Notice. Secondary non-federal amateur licensees operating in this band as of the effective date of this Report and Order may continue while the Commission finalizes plans to reallocate spectrum in the 3.45-3.55 GHz band. Authorizations will sunset on a date consistent with the first possible grant of flexible use authorizations to new users in that portion of the band—for example, 90 days after the close of the auction if we adopt a licensing scheme that will result in an auction to assign licenses. We revise the Table of Allocations accordingly.⁷²

34. Clearing all secondary operations, including amateur operations, from this spectrum will

⁶⁵ Nexstar Reply 7-9.

⁶⁶ NBCUniversal Media Comments at 4-5; Nexstar Reply at 7-9.

⁶⁷ NBCUniversal Media Comments at 5; Nexstar Reply at 8.

⁶⁸ NOAA National Weather Service Radar Operations Center, NEXRAD (WSR-88D) Technical Information, Jul. 11, 2017, <https://www.roc.noaa.gov/WSR88D/Engineering/NEXRADTechInfo.aspx>.

⁶⁹ NBCUniversal Comments at 6.

⁷⁰ *Id.* at 5-7; Nexstar Reply at 7-9.

⁷¹ Nexstar Reply at 9.

⁷² *See* Appx. A, Final Rules.

allow us to maximize the band for potential flexible use operations in the future. Further, to prevent adjacent-channel issues and to preserve the possibility of additional clearing for flexible use licensing below 3.45 GHz, we find that sunseting the secondary amateur allocation from the entire 3.3-3.5 GHz portion of the band is in the public interest.

35. Unlike the case of radiolocation operations in the 3.3-3.55 GHz band, amateur stations in this band are licensed on a shared basis. However, only amateur service operators with privileges for transmitting in this band based on their license class may operate stations on this spectrum.⁷³ The class of a given operator's license determines on which of the many amateur frequencies it may operate, and amateurs with access to the 3.3-3.5 GHz band also have access to a large number of other bands.⁷⁴ These include bands with similar characteristics and operations such as the 2.39-2.45 GHz and 5.65-5.925 GHz bands, as well as dozens of others.⁷⁵ Due to the unique nature of the licensing of the amateur service, we do not provide for relocation of these operations in the same way as we do for radiolocation operations. Instead, we will allow amateur operators to choose for themselves whether to continue these operations in alternate spectrum, and which available spectrum to use.

36. Some commenters, noting the importance of services provided by amateur operators in this band, including both private and emergency communications networks, object to the removal of the secondary amateur allocation in the 3.3-3.5 GHz band.⁷⁶ The majority of amateur operators providing comments generally did not discuss their ability to retune or relocate their operations, but instead pointed to the nature of their operations and expressed concerns that a removal of the allocation would end their ability to operate; those that did discuss relocation indicated that it may not be possible with their current equipment.⁷⁷

37. Notwithstanding the utility of amateur operations in this band, operators that chose to construct networks in this band did so despite the fact that the amateur allocation was secondary and entirely subject to current or future primary operations.⁷⁸ As part 97 of our rules makes clear, amateur operations are a noncommercial, voluntary service.⁷⁹ Amateur stations are permitted to operate in many

⁷³ See 47 CFR Part 97. Amateur licenses are issued for six distinct classes based on the licensee's performance in examinations designed to test their skills and abilities in operating an amateur station. Different license classes provide access to different spectrum bands. In addition to the three classes of licenses issued today (Technician, General, and Amateur Extra), there are three grandfathered license classes (Novice, Technician Plus, and Advanced). Amateur operators also hold a station license in addition to their operator license, *see id.* § 97.5(b)(1) ("The primary station license is granted together with the amateur operator license.").

⁷⁴ 47 CFR § 97.301.

⁷⁵ The other bands available to amateurs of different license classes are: 135.7-137.8 kHz; 472-479 kHz; 1.8-2 MHz; 3.525-3.6 MHz; 3.7-4 MHz; 7.025-7.3 MHz; 10.1-10.15 MHz; 14-14.350 MHz; 18.068-18.168 MHz; 21-21.450 MHz; 24.89-24.99 MHz; 28-29.7 MHz; 50-54 MHz; 144-148 MHz; 219-220 MHz; 222-225 MHz; 420-450 MHz; 902-928 MHz; 1240-1300 MHz; 2300-2310 MHz; 10-10.5 GHz; 24-24.25 GHz; 47-47.2 GHz; 76-81 GHz; 122.25-123 GHz; 134-141 GHz; and 241-250 GHz. *Id.*

⁷⁶ As the Commission recognized in the *Notice*, the 3.40-3.41 GHz band is designated for communications to and from amateur satellites. *3.1-3.55 GHz NPRM*, 34 FCC Rcd at 12666, para. 13. However, no amateur satellite uses these frequencies. *See* Radio Amateur Satellite Corporation Comments at 4. Amateur operators generally did not discuss their ability to retune.

⁷⁷ *See, e.g.*, Letter from Kevin Milner, Secretary, Treasurer, Ski Country Amateur Radio Club, to Federal Communications Commission, WT Docket No. 19-348, at 1 (filed Dec. 6, 2019) (arguing that its equipment cannot be re-channeled below 3.4 GHz and seeking relocation costs).

⁷⁸ 47 CFR § 2.106, p. 40 (listing amateur allocation as secondary in the 3300-3500 MHz band).

⁷⁹ *Id.* § 97.1; *see also id.* § 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.").

different bands; amateur stations operating in the 3 GHz band have several other nearby bands available to them with similar propagation characteristics, such as the nearby 2 GHz band and the 5 GHz band.⁸⁰ After the authorization to operate sunsets for secondary amateur licensees here, amateur stations will continue to have available these and other bands that are allocated for amateur use.

IV. FURTHER NOTICE OF PROPOSED RULEMAKING

38. We propose to make 100 megahertz of spectrum in the 3.45-3.55 GHz band available for flexible use wireless services throughout the contiguous United States and propose to add a co-primary, non-federal fixed and mobile (except aeronautical mobile) allocation to the band. Federal radiolocation operations would retain co-primary status in the band and incumbent federal operations in the band would need to coordinate with and not cause harmful interference to any new, flexible use operations in the band. However, in certain enumerated circumstances, we propose that non-federal systems are not entitled to protection against harmful interference from federal operations (and limited restrictions may be placed on non-federal operations). We seek comment on an appropriate coordination regime that would promote productive ongoing negotiations between federal incumbents and new, commercial flexible use licensees. We propose unpaired, 20-megahertz blocks for this band to align with the recently reallocated 3.7 GHz band, licensed on an exclusive geographic area basis by Partial Economic Areas. In addition, we propose service, technical, and competitive bidding rules for flexible use licensees in the band, which largely align with the 3.7 GHz band rules.

39. We also seek comment on how the Commission should relocate non-federal radiolocation operators to the 2.9-3.0 GHz band. We propose that the Commission use its section 316 authority to (1) modify existing secondary, non-federal radiolocation licenses such that they are no longer authorized to operate in the 3.3-3.55 GHz band following the sunset date (i.e., a date consistent with the first possible grant of flexible use authorizations to new users); and (2) modify such licenses to authorize their use in the 2.9-3.0 GHz band to allow licensees to continue providing the services they provide today. In addition, we seek comment on whether to extend the *Emerging Technologies* framework in this specific instance to include some reimbursement for secondary users relocating out of the 3.3-3.55 GHz band and also seek comment on the nature of such relocation costs. Further, we seek comment on whether it is in the public interest to sunset amateur use in the 3.3-3.55 GHz band in two separate phases, e.g., first above 3.4 GHz, which is the focus of this item, and later in that portion of the band below 3.4 GHz.

A. Reallocating the 3.45-3.55 GHz Band for Commercial Wireless Use

40. We propose to reallocate the 3.45-3.55 GHz band on a co-primary basis for non-federal fixed and mobile (except aeronautical mobile) services, as we have in certain other bands.⁸¹ Making this band available for non-federal fixed and mobile (except aeronautical mobile) services on a co-primary basis with federal incumbents would enhance the Commission's efforts to provide additional critical mid-band spectrum along with the low-band and high-band spectrum already licensed to support next generation wireless networks. We seek comment on this proposal.

41. Under Section 303(y) of the Communications Act of 1934, as amended, the Commission is permitted to allocate spectrum for flexible uses if the allocation is consistent with international

⁸⁰ See 47 CFR §§ 2.106 and 97.301 (listing numerous amateur allocations across a variety of frequencies).

⁸¹ See, e.g., *Reallocation of Television Channels 60-69, the 746-806 MHz Band*, ET Docket No. 97-157, Report and Order, 12 FCC Rcd 22953 (1998); *Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52-59)*, GN Docket No. 01-74, Report and Order, 17 FCC Rcd 1022 (2002) (the Commission found it in the public interest to transfer TV Channels 52-69 (698-806 MHz) from broadcast use to new wireless and public safety uses, and added primary fixed and mobile allocations to the 698-806 MHz band). See also *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 Order*) (the Commission added co-primary fixed and mobile allocations to the 3550-3650 MHz band to facilitate a new commercial broadband service at 3550-3700 MHz); *3.7 GHz Service Order*, 35 FCC Rcd 2343.

agreements and if the Commission finds that: (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. We anticipate that our proposal to add co-primary allocations for non-federal fixed and mobile (except aeronautical mobile) services to the U.S. Table of Frequency Allocations for the 3.45-3.55 GHz band would meet these criteria.

42. We tentatively conclude that our proposal would serve the public interest by advancing U.S. leadership in next-generation 5G networks. A key element of such leadership is making additional critical mid-band spectrum available for 5G services as we propose in the Further Notice. In addition, we expect that our proposal will promote, rather than deter, investments in the band by flexible use licensees. Mid-band spectrum is particularly well-suited for 5G buildout due to its desirable coverage, capacity, and propagation characteristics and we anticipate that this spectrum should attract investment from 5G network operators. Further, the actions we take in the accompanying Report and Order and propose in this Further Notice should not result in harmful interference among users of the 3.45-3.55 GHz band. To the contrary, our decision in the Report and Order to remove all secondary allocations and relocate certain secondary operations from the band will minimize the potential for interference to new flexible use licensees; and our proposals in the Further Notice should enable coordination with incumbent federal operations. In addition, our proposed allocation would harmonize the Commission's allocation for the 3.45-3.55 GHz band with international allocations.⁸²

43. We seek comment on our proposal to add this allocation and on our initial assessment that doing so is consistent with the requirements of Section 303(y). We also ask commenters to provide quantitative estimates of our proposal's costs and benefits to current and potential non-federal users of the band.

⁸² 47 U.S.C. § 303(y)(1). 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, *Optimizing Arrangements for the 3400-3575 MHz Band Planning Decisions and Preliminary Views* (2019), <https://www.acma.gov.au/sites/default/files/2019-11/IFC-12-2019-Optimising-arrangements-3400-3575-MHz-Band-Planning-decisions-and-preliminary-views.docx>. In Canada, an auction of spectrum in the 3.45-3.65 GHz range is expected in late 2020. Innovation, Science and Economic Development Canada, *Spectrum Outlook 2018-2022* at 28 (2018), <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11403.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, plans to auction 5G licenses in the 3.4-3.8 GHz band in 2020. ARCEP, *Allocation of 3.4-3.8 GHz Band Frequencies: ARCEP Transmits its Proposed Allocation Procedure and Candidate Obligations to the Government* (Nov. 21, 2019), <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. Janette Stewart, et al, *5G Mid-Band Spectrum Global Update at A-11* (2020), <https://www.ctia.org/news/report-5g-mid-band-spectrum-global-update> (*5G Mid-Band Spectrum Report*). 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 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. *5G Mid-Band Spectrum Report* at A-19. 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. *5G Mid-Band Spectrum Report* at A-23. Sweden plans to award licenses in the 3.4-3.8 GHz band for 5G in October 2020. *5G Mid-Band Spectrum Report* at A-25. 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* (April 25, 2018), <https://www.ofcom.org.uk/spectrum/spectrum-management/spectrum-awards/awards-archive/2-3-and-3-4-ghz-auction>.

B. Future of Federal Incumbent Use in the 3.45-3.55 GHz Band

44. The 3.45-3.55 GHz band currently is used by the DoD for high-powered radar systems on fixed, mobile, shipborne, and airborne platforms. Consistent with Congress's directive in the MOBILE NOW Act, and following our proposal in 2019 to take the first steps to make the 3.1-3.55 GHz band available for flexible use commercial operations, the DoD recently indicated that it intends to promote cooperative sharing of the band with new fixed and mobile, except aeronautical mobile, systems to the extent possible. DoD intends to allow for commercial deployments in the band by adjusting its concept of operations for many of these systems to the extent possible without fully vacating the band. To this end, the AMBIT selected the specific frequency band 3450-3550 MHz for commercial access. Consistent with the AMBIT study, we propose that federal systems operating in the band may not cause harmful interference to non-federal operations in the band. However, non-federal systems are not 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; (2) in Periodic Use Areas; and (3) during times of National Emergency. We seek comment on our proposal.

45. Upon completion of the AMBIT study, a number of circumstances were identified where the DoD will require continued access to the band. Specifically, the DoD has identified a list of "Cooperative Planning Areas," in which it anticipates that federal operations will continue subsequent to 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. For each Cooperative Planning Area, the DoD intends to receive input from and provide information to the wireless industry, including commercial operators, in the near future (i.e., before the spectrum is auctioned) regarding commercial network planning and deployments in order to minimize impacts from incumbent federal operation on future commercial operations and to enable effective federal operations. For example, the DoD anticipates holding workshops with wireless carriers to begin discussing such issues, similar to information sharing and transition planning that occurred with industry as part of the AWS-3 auction.⁸³ The DoD anticipates that, once licenses are issued, it would reach mutual agreements with individual licensees for commercial network planning. In addition, the DoD has identified a number of "Periodic Use Areas" that overlap with certain Cooperative Planning Areas, in which the DoD will need episodic access to all or a portion of the band in identified, limited geographic areas.⁸⁴ The DoD anticipates that it will need to coordinate federal usage of the spectrum with affected licensees for specific times, bandwidths, and locations. In both cases, the coordination procedures would need to ensure that the DoD has authority to radiate and that protection from interference would be adequate to preserve military readiness, capabilities, and national security. We seek comment on these concepts and how to incorporate them into future coordination procedures.

46. In light of the AMBIT agreement recently reached between the DoD and the White House, we seek comment on an appropriate coordination regime that would promote productive ongoing negotiations between federal incumbents and new, commercial flexible use licensees. What aspects of network planning should be considered during coordination efforts and what are the ramifications of such negotiations? For example, should federal incumbents and new, commercial licensees be required to coordinate network architecture, power levels, shielding, antenna backlobe/sidelobe and/or filter requirements to minimize potential co- and adjacent channel interference to and from commercial systems? How should disagreements be resolved? Should timelines be applied to such negotiations? What other safeguards would be appropriate to ensure efficient and productive coordination negotiations?

⁸³ See "The Federal Communications Commission And The National Telecommunications And Information Administration: Coordination Procedures In The 1695-1710 MHz and 1755-1780 MHz Bands," Public Notice, 29 FCC Rcd 8527 (WTB/NTIA 2014).

⁸⁴ 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.

For Periodic Use Areas, how would commercial licensees be notified of each periodic use and with how much advance notice? Should any restrictions be placed on periodic use? For example, should there be limitations on duration, frequency of occurrence, frequency band, and time periods for each periodic use? What costs would be involved in the proposed coordination regime, and how large would these costs be? What would be the benefits of such coordination regimes? In addition, we note that under certain environmental conditions tropospheric ducting could occur and harmful interference could be received at large distances from its source.⁸⁵ In such instances, what notification and coordination mechanisms can be used by federal and non-federal users to identify and mitigate such interference? What steps, if any, can network operators and federal users take at system planning stages to account for the effects of tropospheric ducting? How should harmful interference in such instances be resolved? And should there be different procedures or requirements for Cooperative Planning and Periodic Use Areas and the rest of the contiguous U.S. that are not in such areas? Given that federal use of the radio spectrum is generally governed by NTIA while non-Federal use is governed by the Commission,⁸⁶ we anticipate that any guidance or details concerning federal/non-Federal coordination would be issued jointly by NTIA and the Commission. We also seek comment on directing the Wireless Telecommunications Bureau and the Office of Engineering and Technology to administer details of the coordination regime for the 3.45 GHz band, and on whether to codify such direction into our rules.

47. Incumbent federal operations and new non-federal fixed and mobile operations would need to coordinate with each other to facilitate shared use of the band in specified areas and time periods.⁸⁷ We note that this proposed coordination regime departs from our typical approach where new licensees are required to avoid harmful interference to remaining primary incumbents. We propose this novel coordination regime in an effort to further the Commission's 5G FAST Plan and to unleash mid-band spectrum for next generation wireless services. Further, our proposed 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.⁸⁸ Moreover, the proposed coordination framework will benefit federal agencies and the military by making additional broadband and 5G networks available in the United States. We seek comment on how federal radiolocation and non-federal fixed and mobile operators could coordinate operations in the band, including the extent of coordination mechanisms and costs and benefits of different approaches.

48. We seek comment on technical parameters that would inform federal and non-federal coordination in the band. We invite commenters to discuss the likely costs and benefits of such parameters to ensure that new, co-primary commercial licensees are protected from harmful interference from incumbent federal operations. For example, what is the appropriate maximum co-channel received power from pulsed radar signals that could be tolerated as an input to commercial mobile cellular equipment (both base station and user equipment) without creating a significant impact on the user experience? We note that testing conducted by the Institute for Telecommunications Science has observed an impact on cellular phone key performance metrics and user experience as a result of radar-

⁸⁵ Tropospheric ducting is a RF propagation phenomenon that occurs when there is a temperature inversion (i.e. at high altitude air temperature generally decreases; during an inversion a layer of warmer air sits above the cooler air) which causes the refractive index of the atmosphere to rise. When ducting occurs, the RF signal travels along the boundary of the inversion rather than following its expected path. Ducting is most likely to occur in coastal areas and RF signals may be received hundreds of miles away.

⁸⁶ See 47 U.S.C. §§ 305(a), 902(b)(2)(A).

⁸⁷ Incumbent operations include all current and planned federal use in the 3450-3550 MHz band.

⁸⁸ 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/>

like interference.⁸⁹ These performance metrics include but are not limited to: increased Block Error Rate (BLER), changes in coding and modulation schemes, an increase in mobile handset transmit power, a reduction in throughput (either uplink and downlink traffic), increased latency and increased jitter. Beyond the user experience, we seek comment on input power at which new commercial receivers, both base stations and mobile stations, would experience desensitization. What sensing mechanisms inherent in modern mobile cellular communication systems and networks could be used for identifying external interference caused by federal operators? Once identified, how should information about such interference and degradation to commercial operations be quantified and reported to the federal operators? What other mechanisms could be used to enable effective coordination in this band?

49. While the Institute for Telecommunications Science has published preliminary testing results about the likely impact of federal radars on commercial 4G LTE systems,⁹⁰ additional data may be needed to further validate the conclusions and values for 5G systems. We therefore seek technical analyses and comparisons between LTE and 5G new radio (NR) receiver performance in the presence of interference from radar-type pulses. We also seek comment on the impact the differences between LTE and 5G systems could have on the technical parameters and rules that we may consider and adopt for this band. In addition, we invite commenters to submit technical studies and analyses that account for the new 5G physical layer designs, including symbol time and structure, subcarrier spacing, channel coding, and interleaving as it relates to the ability of 5G NR to operate in the presence of pulsed radar. We also invite commenters to submit technical studies on other variabilities in radar waveforms, including frequency domain bandwidth and chirping, pulse duration, and duty cycle.

50. We seek comment additionally on how to assess and limit potential harmful interference to new 3.45-3.55 GHz flexible use licensees from federal operations in adjacent bands. For example, what limits should be placed on the maximum power injected from federal operations in adjacent bands to non-federal receivers in the 3.45-3.55 GHz band to avoid adverse effects on the operation of commercial users? Are there filters that commercial users could use to minimize the potential for harmful interference? What are the minimum filtering requirements necessary to ensure that commercial operations will not suffer harmful interference in the presence of ongoing federal operations? How would such filters affect the size of the areas where commercial operations may be impacted by ongoing federal operations? Should the rules require commercial systems to install filters with minimum performance specifications to enable use of the 3.45-3.55 GHz band by federal and non-federal users? What form of sensing or notification-based mechanisms would facilitate successful and automated coordination between federal and non-federal operations in the 3.45-3.55 GHz band? What are the costs and benefits of a sensing regime as compared to a notification-based regime?

51. What other techniques could federal incumbents and new commercial operators use to minimize interference to commercial operators? Are there additional steps that the DoD and commercial operators could take to adjust their operations to help block emissions to the non-federal fixed or mobile users and to federal users in areas where federal and non-federal operations will be in close proximity to one another? Could the DoD incorporate its efforts into Cooperative Planning Area negotiations? Could the sensing and notification-based mechanisms used in the 3.5 GHz band also be used in this band to enable successful coordination between federal and non-federal operations in the 3.45-3.55 GHz band? What would be the costs and benefits of these alternative approaches?

52. If we make this band available for non-federal fixed and mobile (except aeronautical mobile) operations, we seek comment on how to coordinate incumbent federal radar operations in the future. Specifically, the DoD will require access to the band during times of National Emergency to

⁸⁹ See Sanders, G. A., J. E. Carroll, F. H. Sanders and R. L. Sole, Effects of Radar Interference on LTE (FDD) eNodeB and UE Receiver Performance in the 3.5 GHz Band, NTIA Technical Report TR-14-506 (2014), <http://www.its.blrdoc.gov/publications/2759.aspx>.

⁹⁰ See *id.*

fulfill military operational needs. Accordingly, we propose that during times of National Emergency federal users are authorized to operate within the band as required to meet operational mission requirements. Further, we propose that upon notification, commercial licensees shall terminate or otherwise adjust their operations to prevent harmful interference to the federal operations. We seek comment on our proposal. How would commercial operators be informed of a National Emergency and how would continued coordination be facilitated? What should constitute a “national emergency” in this context? How quickly would a commercial operator be required to terminate or adjust its operations following notification? How would the termination of a National Emergency be communicated to a commercial operator? In the event a commercial operator does not timely terminate or adjust its operations and incurs damage to its equipment from federal operations, should the federal operators be held harmless from such damage? What other coordination procedures would be beneficial under these circumstances? NTIA states that it is considering “the development [of] an automated, real-time, incumbent-informing spectrum sharing system (‘incumbent-informing system’) that NTIA would operate in conjunction with DoD to notify commercial entities when the latter would need to cease operations.”⁹¹ We seek comment on the appropriate means to coordinate operations of federal users and commercial licensees. We seek comment on the costs and benefits of such coordination regimes.

C. 3.45-3.55 GHz Band Plan

53. *Block Sizes.*—We seek comment on the appropriate block size to promote efficient and robust use of the band for next generation wireless technologies, including 5G. We propose to adopt 20 megahertz blocks for this band to align with the 3.7 GHz band, which we recently reallocated for fixed and mobile use, and for which we likewise adopted 20- megahertz spectrum blocks. As the Commission noted in the *3.7 GHz Service Order*, 20 megahertz blocks provide flexibility for manufacturers and licensees to tailor applications in the band to suit future needs.⁹² Further, for carrier frequencies below 6 GHz, 20 megahertz is among the 13 channel bandwidths 3GPP has specified for 5G deployments.⁹³ We seek comment on this proposal. Are there reasons we should deviate from this approach here? Alternatively, should we license this band by 10 megahertz blocks akin to Priority Access Licenses (PALs) in the Citizens Broadband Radio Service operating in the 3.5 GHz band? If so, why? We ask commenters to detail the advantages and disadvantages of their favored approach, including any costs and benefits. We also seek comment on potential alternatives.

54. *Spectrum Block Configuration.*—While the Commission historically tended to license bands that support flexible use on a paired basis,⁹⁴ more recently, it has licensed spectrum used for mobile broadband services on an unpaired basis.⁹⁵ We propose to allocate the 3.45-3.55 GHz band as an unpaired band to promote a consistent spectral environment with the nearby mid-band allocations in the

⁹¹ NTIA July 2020 Report at 11.

⁹² *3.7 GHz Service Order*, 35 FCC Rcd at 2378, para. 74.

⁹³ 3GPP TS 38.104 v16.1.0 (2019-09) (Release 16), NR; Base Station (BS) Radio Transmission and Reception, at 31 (5.3.2 Transmission bandwidth configuration), <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3202>. See also 3GPP, *Release 16* (updated Oct. 2, 2019), International Telecommunication Union, *ITU towards “IMT for 2020 and beyond,”* <https://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5d/imt-2020/Pages/default.aspx>.

⁹⁴ Generally, the Commission has specified the downlink and uplink bands only when necessary to avoid harmful interference, e.g., to federal incumbents. See, e.g., 47 CFR § 27.5(h) (AWS-1) (specifies 1710-1755 MHz as mobile/uplink band to accommodate Federal incumbents, which necessitated specifying paired 2110-2155 MHz as base/downlink band). Compare *id.* § 24.229(a) and (b) (Broadband PCS Blocks A-F are paired but the rule does not specify uplink/downlink).

⁹⁵ 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); *3.5 GHz Order*, 30 FCC Rcd at 3989, para. 91; *3.7 GHz Service Order*, 35 FCC at 2378-79, para. 75.

3.5 GHz and 3.7 GHz bands, which are also unpaired in the United States. This approach is consistent with industry standards.⁹⁶ We seek comment on our approach as well as alternative approaches, including the costs and benefits of a commenter's favored approach. What administrative measures would be necessary to keep track of how spectrum blocks are being used with time division duplexing (TDD) within the band or frequency division duplexing (FDD) paired with other bands? What are the consequences of adopting this flexible approach as compared to a more prescriptive approach? What other factors, including costs or benefits of this approach, should the Commission consider?

55. *Use of Geographic Licensing.*—Consistent with our approach in several other bands used to provide fixed and mobile services, we propose to license the 3.45-3.55 GHz band on an exclusive, geographic area basis.⁹⁷ Geographic area licensing provides flexibility to licensees, promotes efficient spectrum use, and helps facilitate rapid assignment of licenses, utilizing competitive bidding when mutually exclusive applications are received. We seek comment on this approach, including the costs and benefits of adopting a geographic area licensing scheme. If a party opposes using geographic licensing, it should explain its position, describe the licensing scheme it supports, and identify the costs and benefits associated with its alternative licensing proposal.

56. *Guard Bands.*—We recognize that our proposed 3.45-3.55 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. While the creation of guard bands is one option for protecting adjacent systems, such a use of valuable spectrum is inefficient and could be avoided using other technical solutions.⁹⁸

57. We note that our proposed technical rules mirror many of those adopted in the *3.7 GHz Service Order*, in which the Commission likewise did not create a guard band for the lower edge of the 3.7 GHz band, which also abuts the 3.5 GHz band. We expect that our proposed technical rules also would sufficiently protect adjacent operations at the lower edge of the band. Accordingly, we do not propose creating guard bands at either end of the 3.45-3.55 GHz band. We seek comment on this proposed approach and its underlying assumptions. If a commenter supports the creation of one or more guard bands, then it should include a technical analysis justifying the need for such guard band(s), including the costs and benefits.

D. Relocation of Secondary Non-Federal Radiolocation Operations

58. In the accompanying Report and Order, we remove the non-federal secondary allocations in the 3.3-3.55 GHz band for radiolocation operations and relocate them to the 2.9-3.0 GHz band.⁹⁹ In this Further Notice, we seek comment on how we should relocate non-federal radiolocation operators to the 2.9-3.0 GHz band and the timing for doing so.

59. In the Report and Order, we determine that secondary non-federal radiolocation licensees operating in this band as of the effective date of this Report and Order may continue to operate while the Commission finalizes plans to reallocate spectrum in the 3.45-3.55 GHz band. Authorization for these operations will sunset on a date consistent with the first possible grant of flexible use authorizations to new users in that portion of the band. For example, if we adopt a licensing scheme that will result in an

⁹⁶ 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).

⁹⁷ See, e.g., 47 CFR § 27.6(h), (i), and (m) (AWS-1, AWS-4, and 3.7 GHz Service bands, respectively).

⁹⁸ See *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).

⁹⁹ As explained in the Report and Order, due to the nature of amateur licensing, we do not provide for relocation of amateur operations in the 3.3-3.5 GHz band.

auction to assign licenses, non-federal radiolocation use would sunset within 90 days of the close of the auction. We do not propose, however, to bifurcate the sunset of the secondary radiolocation allocation as we propose for the amateur allocation, first sunsetting the allocation above 3.45 GHz, and later at 3.3-3.4 GHz.¹⁰⁰ There are far fewer radiolocation operators in the lower 3 GHz band than amateur users, and their operations are higher power. We seek comment on this approach. Further, within this framework, we seek comment on the appropriate timing of transitioning such licenses to the 2.9 to 3.0 GHz band. What interim benchmarks or deadlines might be appropriate to best relocate such licensees without interruptions to their operations?

60. The Commission has broad authority under section 316 of the Communications Act to modify licenses “if in the judgment of the Commission such action will promote the public interest, convenience, and necessity.”¹⁰¹ The courts have construed the term “modify” to mean that the Commission may not effect a “fundamental change” to a license under this authority.¹⁰² Courts have found that if a licensee can continue to provide substantially the same service, a modification to that license is not a fundamental change.¹⁰³

61. In order to clear the entire 3.3-3.55 GHz band for future flexible use licenses, we propose to use our 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 following adoption of final rules based on the proposals in this Further Notice. We find that such modifications are consistent with our statutory authority and would serve the public interest. Given our decision to sunset the allocation for these secondary, non-federal radiolocation operations, we propose to modify their licenses accordingly to authorize use in the 2.9-3.0 GHz band, which would allow them to continue providing the same services as they do today. We propose that, once we finalize procedures for the relocation of non-federal radiolocation licensees and determine the appropriate timing for the transition of such licensees to their new frequencies, we would issue an Order of Proposed Modification under section 316 to modify their licenses to operate on these new frequencies. We seek comment on this proposal.

62. We also seek comment on whether the Commission should require new flexible use licensees to reimburse incumbent non-federal, commercial radiolocation operators for relocation costs they might incur. We note that non-federal radiolocation operations in the 3.3-3.55 GHz band are pursuant to a secondary allocation and that the Commission has previously found that such secondary users were not entitled to reimbursement.¹⁰⁴ However, we seek comment on whether we should expand the *Emerging Technologies* framework in this specific instance to include some reimbursement for

¹⁰⁰ Specifically, we seek comment below on whether to sunset the amateur allocation in phases, first the 3.45-3.55 GHz portion, then the 3.3-3.40 portion.

¹⁰¹ 47 U.S.C. § 316(a)(1); see *California Metro Mobile Communications v. FCC*, 365 F.3d 38, 45 (D.C. Cir. 2004) (“Section 316 grants the Commission broad power to modify licenses; the Commission need only find that the proposed modification serves the public interest, convenience and necessity.”).

¹⁰² See, e.g., *MCI Telecommunications Corp. v. AT&T*, 512 U.S. 218, 228 (1994) (holding that statutory “authority to ‘modify’ does not contemplate fundamental changes”); *Cnty Television, Inc. v. FCC*, 216 F.3d 1133, 1140–41 (D.C. Cir. 2000) (applying that reasoning to section 316 and suggesting that impairing the ability of a licensee to provide the same services as those enabled by the original license might be considered a fundamental change), *cert. denied*, 531 U.S. 1071 (2001).

¹⁰³ See, e.g., *Cnty Television, Inc.*, 216 F.3d at 1136, 1140-41.

¹⁰⁴ See *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, 30 FCC Rcd 6746 at 130, Second Order on Reconsideration, GN Docket No. 12-268 (2015) (noting that “The Commission has never required that primary licensees...moving into a band reimburse users that have been operating on a secondary basis in that band.”). The Commission subsequently provided for reimbursement of these secondary licensees’ relocation expenses as a result of Congressional direction. *LPTV, TV Translator, and FM Broadcast Station Reimbursement*, 34 FCC Rcd. 1690, Report and Order, MB Docket No. 18-214 (2019).

secondary users relocating out of the 3.3-3.55 GHz band.¹⁰⁵ We recognize that reimbursement would increase the costs of participating in our new flexible use licensing regime, and that it could therefore reduce investment in the band and proceeds generated by an auction of licenses in the band. We seek comment on this possibility and note that section 309(j) of the Communications Act only requires the Commission to recover a “portion of the value of the public spectrum resource made available for commercial use.”¹⁰⁶ We also seek comment on the level of investment in these commercial operations, and the remaining useful life of the equipment used for such operations, as well as on the importance of the services they provide. We therefore seek comment on the costs and benefits of such reimbursement. If we elect some form of reimbursement for these secondary users, should we require all incoming licensees to share in reimbursing such relocation costs?¹⁰⁷ How should this shared reimbursement structure work? We invite reference to prior shared reimbursement regimes.

63. Commenters should specify the extent to which the Commission should or should not expand the *Emerging Technologies* framework to include relocated secondary licensees. If we should provide for reimbursement of relocation costs, to what extent is that decision specific to the secondary, non-federal radiolocation operations in the 3.3-3.55 GHz band or generally applicable to secondary users across other bands and services?¹⁰⁸ We note that operators in this band perform important safety functions, in particular for weather forecasting¹⁰⁹ and physical security,¹¹⁰ and, despite their secondary status, have operated without significant interference risks from primary federal operations.¹¹¹ To what extent should these factors, or others, play a role in guiding our decision on reimbursement in this proceeding and otherwise?

64. Additionally, we seek comment on costs associated with relocating secondary, non-federal radiolocation operations.¹¹² We seek comment on the nature of relocation costs and how best to quantify them. For example, what equipment or software would need to be modified or replaced? We seek comment on the frequency agility of existing radars; could such equipment be retuned to the relocated band or are other modifications required? If changes are needed, commenters should address the nature of such changes, e.g., new filters, new antennas, etc. Are labor costs likely to be incurred in implementing the relocations? We seek comment on how long relocations would be expected to take and on any changes in operations that need to be made to operate in new bands. Commenters should discuss in detail any such specific costs. Commenters should also discuss how costs should be calculated and what, if any, costs should be excluded, as well as the most appropriate Commission implementation of any reimbursement regime.

¹⁰⁵ *Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies*, ET Docket No. 92-9, First Report and Order and Third Notice of Proposed Rulemaking, 7 FCC Rcd 6886 (1992).

¹⁰⁶ 47 U.S.C. § 309(j)(3)(C).

¹⁰⁷ *See, e.g., Amendment of Part 2 of the Commissions' Rules to Allocate 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, 21 FCC Rcd 4473, 4513, para. 74 (2006) (requiring new licensees to reimburse incumbents for voluntarily relocating from a band and providing that new licensees will be entitled to pro rata cost sharing from other new licensees that also benefitted from the incumbents' self-relocation).

¹⁰⁸ NBCUniversal argues that promoting the increased intensity of spectrum use, a goal of the Commission, may be best served by the Commission encouraging investments in secondary spectrum uses. NBCUniversal Comments at 12-13.

¹⁰⁹ *See id.* at 2-6.

¹¹⁰ *See* Southern Company Services Reply Comments at 2.

¹¹¹ NBCUniversal Comments at 8.

¹¹² In its reply comments, Nexstar noted that its cost to transition to the 3.0-3.1 GHz band would be approximately \$1 million and take 12 months. Nexstar Reply Comments at 8.

65. Which of the relocation mechanisms that the Commission has used in the past would be appropriate here? Are there unique logistical concerns with relocation planning for these operations that we should address by rule, as opposed to by public notices to be issued by the relevant bureaus? We propose to handle any mutually exclusive applications for new frequencies based on our existing part 90 shared spectrum use rules,¹¹³ but we seek comment on alternatives.

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

66. In the accompanying Report and Order, we sunset the allocation for amateur operations in the 3-3.3.5 GHz band to allow for full commercial use of the spectrum to be made available through flexible use licenses. We authorize continued operations for amateur license holders only until the date consistent with the first possible grant of flexible use authorizations to new users in the band, consistent with the timeline for relocation of secondary radiolocation services.

67. We note, however, that certain commenters caution against clearing spectrum of amateur operations earlier than necessary to accommodate new wireless broadband operations.¹¹⁴ When considering the timeline for relocation of non-federal radiolocation operations, the Commission considered that there are a small number of these licensees operating in the band, no commenters objected to the relocation, and that commenters agreed that existing equipment can be upgraded to support relocated operations, leading to reduced expense and complexity.¹¹⁵ Many amateur licensees, by contrast, argue that requiring them to cease operations earlier than necessary would be “a waste of valuable spectrum resources,”¹¹⁶ and other commenters echo this concern.¹¹⁷ Many also argue that, since the focus of future flexible use licensing is above 3.45 GHz, the Commission at a minimum should allow amateur operators to continue below 3.45 GHz for the foreseeable future. In light of these concerns, and of the large number of amateur licensees currently operating in the band, we seek comment on sunseting amateur use in the band in two separate phases.

68. We propose to sunset amateur operations in the 3.4-3.5 GHz band, pursuant to the accompanying Report and Order, but to allow amateur operations in the remainder of the band (i.e., 3.3-3.4 GHz) to continue pending further decisions about the future of this portion of the spectrum. Specifically, we propose that amateur use in the upper portion of the 3.3-3.55 GHz band would sunset according to the procedures set out in the accompanying Report and Order (on a date consistent with the first possible grant of flexible use authorizations to new users in that portion of the band), while amateur use of the lower portion of the band would continue until a future date to be set later in this proceeding. If we adopt this approach, we stress that amateur operations in that lower portion of the band would remain on a secondary basis, and the allocation would continue to be subject to sunset at any time.¹¹⁸

69. Would this approach of bifurcating the amateur allocation and sunseting the two portions on different dates allow amateur operations to continue during the pendency of decisions about use of the band below 3.4 GHz, while still providing future flexible use licensees sufficient protection from harmful interference? What are the costs and benefits of this approach and of any alternatives? If we were to adopt this approach, at what frequency should we split the band? Given the possibility that cross-service adjacent channel interference could result if we allow amateur operations to continue immediately

¹¹³ 47 CFR § 90.173 (assigning frequencies on a non-exclusive, shared basis and requiring cooperation amongst licensees and applicants to reduce interference and make effective use of shared frequencies).

¹¹⁴ Amateur Television Network Comments at 2-5; American Radio Relay League Comments at 2-8.

¹¹⁵ NBCUniversal Comments at 5-7; Nexstar Reply at 7-9.

¹¹⁶ Amateur Television Network Comments at 2-5; American Radio Relay League Comments at 2-8.

¹¹⁷ Open Technology Institute Reply Comments at 7-8.

¹¹⁸ Amateur operators wishing to avoid this uncertainty may take advantage of one of several alternate bands for continued amateur operations, including nearby spectrum in the 2 GHz and 5 GHz bands.

adjacent to 3.45 GHz, we propose to set the upper boundary of this lower portion of the allocation at 3.4 GHz in order to create a 50 megahertz guard band, and seek comment on that proposal. Are there alternatives to this approach that would allow increased amateur use while also providing full protection to flexible use licensees?

70. Finally, we seek comment on whether any modifications pursuant to our Section 316 authority are necessary to accomplish our proposed changes to the amateur allocation. We note the unique nature of amateur licensing relative to other Commission licensees, and that we are not selecting new frequencies for amateur operations because there are many alternate bands available for amateurs to choose from.¹¹⁹

F. Technical Issues

71. We seek comment on appropriate technical rules to maximize the potential uses of the 3.45-3.55 GHz band, particularly for the next generation of wireless services, while minimizing the impact on adjacent band incumbents, consistent with the public interest. In order to promote maximum flexibility for 5G deployments, we propose to align the technical rules for this band with those adopted in the 3.7 GHz band. We seek comment on this overarching proposal and its potential impact on operations in adjacent bands. We also seek comment on alternative approaches. For example, should the technical rules for this band more closely resemble those for the Citizens Broadband Radio Service in the 3.5 GHz band? We seek comment on the technical approach that will maximize the spectral efficiency of 3 GHz spectrum. In addition, we seek comment on appropriate power limits, out-of-band emissions limits, antenna height limits, service area boundary limits, international coordination requirements, and any other technical rules that would maximize flexible use of the band while protecting new, non-federal licensees and federal incumbents in adjacent bands.

72. *Power Limits for Base Stations.*—We seek comment on transmit power limits for base stations in the 3.45-3.55 GHz band. We propose to adopt the same base station power limits that the Commission adopted in the 3.7 GHz band, 1640 watts and 3280 watts of equivalent isotropically radiated power (EIRP) per megahertz in non-rural and rural areas, respectively.¹²⁰ These power levels were used in the AMBIT study, and any change can change the result of the study and produce a corresponding increase or decrease in cooperative planning areas and periodic use areas. We believe these limits would support robust deployment of next-generation mobile broadband services. We seek comment on this proposal. Commenters should provide a technical evaluation of the impact of these proposed power levels on effective coexistence with all operations within the 3.45-3.55 GHz band and across adjacent bands, as well as its costs and benefits.

73. We also seek comment on alternative base station power limits. Should the power be composed of transmit conducted power and antenna gain with some flexibility to “mix and match” both, or should the rule only define the final power in EIRP? While higher power limits may provide additional flexibility for some deployments, what is the impact of high-power base stations on adjacent bands? Commenters that propose alternative base station transmit power limits should include a thorough technical justification for their proposal, including the effect on receiver blocking or other aggregate interference issues impacting receivers operating above and below the band. Commenters should also provide the costs and benefits of such proposals.

74. *Power Limits for Mobile Stations.*—We seek comment on appropriate power limits for mobile stations in the 3.45-3.55 GHz band. Power limits for flexible use mobile services vary in our rules, from 50 milliwatts per megahertz EIRP for mobile stations in the Wireless Communications

¹¹⁹ In addition to spectrum at 2 GHz and 5 GHz, amateur operators have many other bands allocated for their use from which to choose, as discussed above.

¹²⁰ 47 CFR § 27.50(j)(1) and (2). The same limits also apply to broadband PCS stations. *Id.* § 24.232.

Service to 3 Watts EIRP in the 600 MHz band.¹²¹ Most mobile stations, however, operate at levels under 1 Watt to preserve battery life, meet RF exposure limits, and meet power control requirements. We note that most commercial services, including LTE, CDMA, and UMTS, commonly deploy mobile stations which operate at a maximum output power of 23 dBm (200 milliwatts), regardless of higher FCC power limits. 3GPP, however, has defined a higher power class for LTE and 5G at 26 dBm (400 milliwatts).¹²² This development may warrant continued flexibility in our rules to allow for a wider range of device types.

75. We propose to adopt 1 Watt EIRP as the maximum power limit consistent with the 3.7 GHz Service rules.¹²³ We anticipate that this mobile power limit would provide adequate power for robust mobile service deployment. Additionally, this limit would permit operation of mobile user equipment (UE) at two power levels—23 dBm and 26 dBm—as specified in the 3GPP standards for 5G systems, which are both lower than the proposed 1 Watt EIRP limit.¹²⁴ We seek comment on our proposed limit and query whether alternative mobile station power limits should be considered based on expected use cases. Commenters supporting specific mobile station transmit power limits should include a technical justification for such power limits and an evaluation of any coexistence issues. For each proposed power limit, we also seek comment on whether the proposed limit would affect operation of mobile stations in the adjacent Citizens Broadband Radio Service or affect federal users in the 3.5 GHz band. Commenters should provide an analysis of the costs and benefits of their proposals.

76. *Out-of-Band Emission Limits.*—We seek to adopt OOB limits that would both protect incumbent services in adjacent bands while still allowing full commercial use in the new band. At the upper edge, this band is adjacent to the 3.5 GHz band's Citizens Broadband Radio Service and the DoD's shipborne radar operations in the 3550-3650 MHz portion of the band. At the lower edge, the DoD will continue radar operations in the 3100-3450 MHz range for the foreseeable future, and it may increase its use below 3450 MHz as the DoD migrates some radar operation out of the 3.45-3.55 GHz band. In addition, the DoD's use below 3450 MHz is expected to include ground-based and airborne operations, which create additional protection considerations.¹²⁵

77. We propose to adopt an OOB limit of -13 dBm/MHz at the authorized channel edge (as measured at the antenna terminals), consistent with the OOB limit adopted for the 3.7 GHz band.¹²⁶ We believe that this OOB limit will be needed to facilitate widespread deployment of next generation wireless services in the 3.45-3.55 GHz band, while ensuring effective coexistence with the mission critical federal and other non-federal services operating in the adjacent bands. We seek comment on our proposal. We also seek comment on any alternatives. For example, in the nearby Citizens Broadband Radio Service, the Commission adopted a graduated emissions mask to prevent adjacent channel

¹²¹ Specifically, the power limit for mobile stations is 50 milliwatts per MHz EIRP for WCS; 23 dBm/10 MHz (200 milliwatts) EIRP for Citizen Broadband Radio Service end user devices; 1 Watt EIRP for the AWS-1 and AWS-3 uplink bands and the 3.7 GHz band; 2 Watts EIRP for PCS and the AWS-4 uplink band; and 3 Watts EIRP in the 600 MHz band.

¹²² 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).

¹²³ 47 CFR § 27.50(j)(3).

¹²⁴ See 3GPP 38.101-1 NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone (Release 15).

¹²⁵ See Edward F. Drocella, et al., National Telecommunications and Information Administration at 125-126 (2020), <https://www.its.bldrdoc.gov/publications/details.aspx?pub=3236>.

¹²⁶ See 47 CFR § 27.53(l) (3.7 GHz Service emission limits). Given that new wireless technologies support a variety of channel bandwidths, our recent rules specify OOB limits based on power spectral density and we propose the same here. Other services have specified OOB limits based on total power, which we do not believe is appropriate for this band. See, e.g., *id.* § 27.53(h) (AWS emission limits); *id.* § 24.238 (PCS emission limits).

interference from Citizens Broadband Radio Service users to federal radar operations in 3.45-3.55 GHz band.¹²⁷ Is there any reason to use a graduated emissions mask here? Although it does not propose a specific OOB limit, NTIA recommends that the Commission consider “tighter” OOB limits for commercial operations to better facilitate federal and non-federal operations on adjacent frequencies.¹²⁸ Commenters should provide an analysis of the costs and benefits of different options and provide detailed technical analysis in support of their proposals.

78. In addition to the proposed OOB limit at the authorized channel edge, we seek comment on the need for additional emission limits beyond the band edge (i.e., below 3.45 GHz and above 3.55 GHz) to better enable coexistence with systems operating in adjacent spectrum. At the upper edge of the band, adjacent spectrum systems include shipborne and inland federal radars and Environmental Sensing Capability sensors deployed to support Citizens Broadband Radio Service operations in the 3.55-3.65 GHz spectrum range. At the lower edge of the band, federal land-based, airborne and maritime radar systems operate below 3.45 GHz. Without additional emission limits to protect adjacent band operations, would new mobile broadband deployments in the 3.45-3.55 GHz band near federal radar usage areas and deployed Environmental Sensing Capability sensors experience operational impacts which could lower the spectrum’s value and use in some high population areas?

79. OOB limits beyond the authorized channel edge have been adopted in other contexts. In the Citizens Broadband Radio Service, base stations operating in the 3.55-3.7 GHz band are required to comply with a two-step emission limit: (1) -25 dBm/MHz beyond the band edges to a 20 megahertz offset from that edge; and (2) -40 dBm/MHz beyond that.¹²⁹ The Commission adopted this two-step limit to enable flexible deployment and effective coexistence with adjacent systems. 3GPP 5G standards, based on regional regulatory requirements, define similar basic and band-specific base station emission limits for certain mid-band spectrum bands.¹³⁰ For example, the 3GPP standard for bands n77 and n78, which overlap with the 3.45-3.55 GHz band, requires emissions to be reduced below -52 dBm/MHz as measured from the edge of the spectrum band, while emissions for other bands must be reduced below -49 dBm/MHz.¹³¹ For band n48, which applies to 5G base stations in the Citizens Broadband Radio Service band in the U.S., the 3GPP standard is in line with the Commission’s part 96 rules.¹³²

80. To provide more flexibility, and as a baseline for the 3.45 GHz band, we propose to expand the OOB limits at both band edges and require that base stations meet the same two-step limits and values consistent with part 96 as implemented for band n48. We thus propose the following emissions limits for the 3.45 GHz band:

- -13 dBm/MHz at the authorized channel edge;
- Equal to or less than -25 dBm/MHz beyond the band edge down to 3430 megahertz and up to 3570 megahertz;
- Equal to or less than -40 dBm/MHz below 3430 megahertz and above 3570 megahertz.

We summarize our proposed approach in Figure 1 below.

¹²⁷ 47 CFR § 96.41(e)(i).

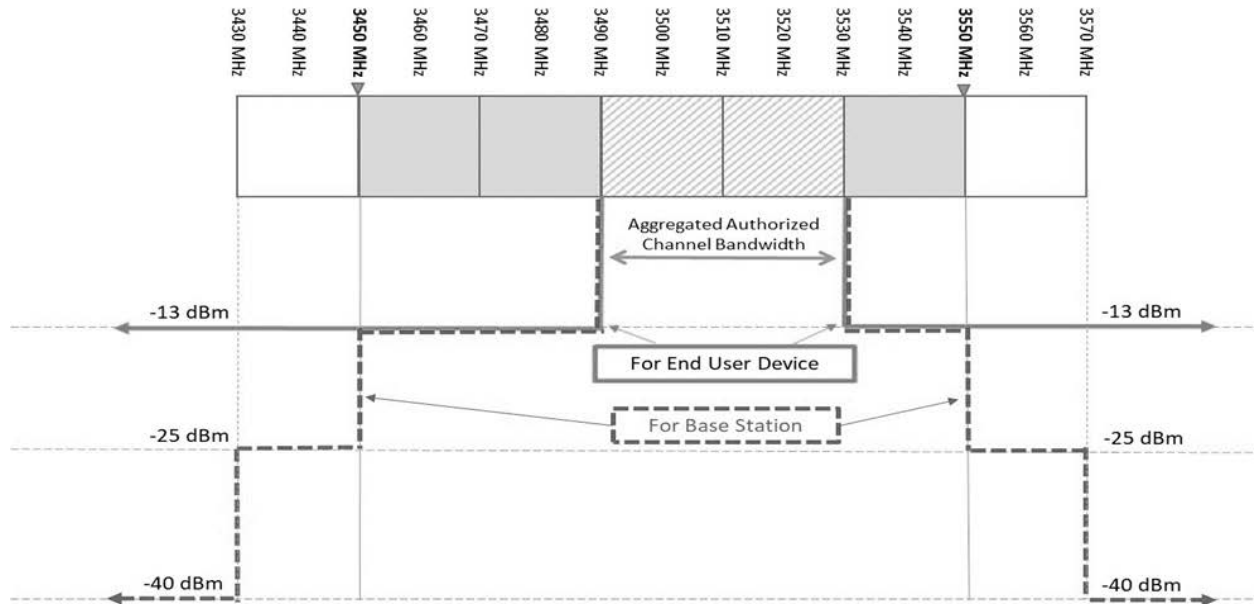
¹²⁸ NTIA July 2020 Report at 11.

¹²⁹ See 47 CFR 96.41(e).

¹³⁰ The 3GPP standards refer to these requirements at Out-Of-Band-Unwanted-Emissions (OBUE). See 3GPP TS 38.104, NR; Base Station (BS) Radio Transmission and Reception. Note: 3GPP specifications refer to 5G as New Radio (NR).

¹³¹ 3GPP TS 38.104, NR; Base Station (BS) Radio Transmission and Reception.

¹³² See 47 CFR § 96.41(e).



81. Our proposed approach, while more relaxed than what is required by 3GPP for similar bands in other regions, should provide more flexibility and consistency with our recent rules and 3GPP limits for adjacent band n48. These limits proposed above should be sufficient for expected coexistence scenarios without imposing unreasonable implementation costs. We seek comment on this proposal and request technical evaluation of this or any alternative approach including alternative limit values or use of slopes rather than steps. For example, should the emission limit start with -13 dBm or -25 dBm at the edge of the band and gradually lower to -40 dBm at a 20 megahertz offset from edge of the band? We also seek comment on whether different limits should be applied based on the location of deployments.

82. To fully define an OOB limit, the Commission's rules generally specify how to measure the power of the emissions, such as the resolution bandwidth. For most AWS bands, the resolution bandwidth used to determine compliance with the base station limit is one megahertz or greater, except that within one megahertz of the channel edge, a resolution bandwidth of at least 1% of the emission bandwidth of the fundamental emission of the transmitter can be employed.¹³³ We propose to adopt the same approach here and seek comment on our proposal. In addition, we seek comment on alternative approaches to defining resolution bandwidth. For example, the Upper Microwave Flexible Use Service (UMFUS) rules under part 30 instead specify use of a one megahertz resolution bandwidth but allow an out of band emission limit of -5 dBm per megahertz from the channel edge out to 10% of the channel.¹³⁴ Should the rules we adopt in this band instead follow the UMFUS approach to defining the resolution bandwidth? Is another approach more appropriate? In addition, like other part 27 services, we propose to apply section 27.53(i), which states that the FCC, in its discretion, may require greater attenuation than specified in the rules if an emission outside of the authorized bandwidth causes harmful interference. We seek comment on this approach.

83. *Mobile Out-of-Band Emissions.*—As with base station OOB limits, we propose to adopt mobile emission limits similar to our standard emission limits that apply to other mobile broadband services. Specifically, we propose that mobile units be required to suppress the conducted emissions to no more than -13 dBm/MHz outside their authorized frequency band. We seek comment on this proposal

¹³³ See 47 CFR § 27.53.

¹³⁴ *Id.* § 30.203(b)(1). For the UMFUS, the Commission adopted a more relaxed emission requirement at the channel edge dependent on channel bandwidth to provide the greatest latitude for channel configuration in the band. *Use of Spectrum Bands Above 224 GHz for Mobile Radio Services*, GN Docket No. 14-177, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014, 8122, para. 308 (2016).

and on other alternative limits to ensure robust coexistence with federal and non-federal operations in adjacent bands, including any costs and benefits. Should the same OOB limits apply to both base stations and mobile stations or are different OOB requirements needed for each? We note that mobile stations and other end user equipment usually operate with power control and at lower maximum power levels than base stations, and that the implementation of more stringent emission limits could be complex and cost-prohibitive for the form factor. We seek comment on all aspects of the OOB limits for base stations and mobile stations. We also seek comment on whether the same or different OOB limits should be applied to emissions within the band as compared to those at either edge of the band. Commenters should address the costs and benefits of their proposals.

84. *Coexistence with Federal and Non-federal Adjacent Band Operators.*—We seek comment on whether additional coordination or technical protection criteria, beyond OOB limits, are necessary to ensure effective coexistence with federal and non-federal adjacent band operators. Regarding federal adjacent band operators, what rules might be necessary to assess and avoid potential excessive receiver blocking that could occur from the aggregated power received from dense deployment of base stations and mobile stations to the federal radars operating below and above the 3.45-3.55 GHz band? Similarly, what rules would be necessary to assess and avoid potential receiver blocking to new flexible use fixed/mobile operations in the band from adjacent high-power radar systems below and above the band?

85. *Field Strength Limit and Market Boundaries.*—If we decide to license the 3.45-3.55 GHz based on geographic service areas, we would need to ensure that such licensees do not cause interference to co-channel systems operating along common geographic borders. We propose to adopt the same parameters that the Commission adopted in the 3.7 GHz band.¹³⁵ Specifically, we propose to adopt a -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. In addition, we propose to allow licensees operating in adjacent geographic areas to agree voluntarily to higher field strength limits at their common boundaries. We seek comment on these proposals as well as alternative approaches to limit field strength or power level in the 3.45-3.55 GHz band. For example, the current rules for AWS-1, AWS-3, and AWS-4 address the possibility of harmful co-channel interference between geographically adjacent licenses by setting a field strength limit from base stations of 47 dB μ V/m at the edge of the license area. In the 3.5 GHz band, the Commission limited aggregate power at PAL boundaries to be less than or equal to -80dBm/10MHz (with the measurement antenna placed at a height of 1.5 meters above ground level) or at a level mutually agreed upon by operators.¹³⁶ Would one of these other approaches be preferable here? Should technical rules allow adjacent affected area licensees to agree voluntarily to higher signal levels like the Citizens Broadband Radio Service, PCS, and AWS services? Should such a power level or field strength limit be based on single node transmission or aggregate powers received? We seek comment on appropriate metrics to be used and the best approaches to determine the limits, including the costs and benefits of such approaches.

86. *Antenna Height Limits.*—We seek comment on the appropriate antenna height limits for the 3.45-3.55 GHz band. We note that while specific antenna height restrictions for AWS-1 and AWS-3 base stations are not set forth in part 27 of our rules, all such services are subject to section 27.56, which bans antenna heights that would be a hazard to air navigation. In the Citizens Broadband Radio Service, there is no height limit for base stations if they operate indoors or are professionally installed.¹³⁷ Furthermore, the co-channel coexistence between adjacent networks and the adjacent channel coexistence between overlapping networks limit field strength at the geographical boundary of the license, which may also effectively limit deployable antenna heights. We propose to adopt the flexible antenna height rules

¹³⁵ 47 CFR § 27.55(d).

¹³⁶ *Id.* § 96.41(d).

¹³⁷ *See id.* §§ 96.43, 96.45.

that apply to AWS-1 and AWS-3 and seek comment on our proposal and any alternatives. Should the antenna height limit for base stations operating in this band be tied to the base station maximum power limit? Should we consider banning antenna heights that would be a hazard to air navigation or air-borne radars in adjacent bands? Commenters should address the costs and benefits of their proposals as well as include technical support.

87. *Canadian and Mexican Coordination.*—Section 27.57(c) of our rules provides that several AWS services, including WCS, AWS-1, AWS-3, AWS-4, and the H Block, are subject to international agreements with Mexico and Canada. We propose to apply the same limitation to the 3.45-3.55 GHz band. Until such time as adjusted agreements between the United States and Mexico, or the United States and Canada, can be successfully negotiated, operations would be prohibited from causing harmful interference across the border, consistent with the terms of the agreements currently in force. We note that further modification (of the proposed or final rules) might be necessary in order to comply with any future agreements with Canada and Mexico regarding the use of these bands. We seek comment on this issue, including the costs and benefits of alternative approaches to this issue.

88. *General Part 27 Rules.*—There are several additional technical rules applicable to all part 27 services, including sections 27.51 (equipment authorization), 27.52 (RF safety), 27.54 (frequency stability), 27.56 (antennas structures; air navigation safety), and 27.63 (disturbance of AM broadcast station antenna patterns). We propose to apply these general part 27 rules to all 3.45-3.55 GHz band licenses. Further, we propose to apply these rules to licensees that acquire their licenses through partitioning or disaggregation (to the extent the service rules permit such aggregation). We seek comment on our proposals, including specific costs and benefits.

G. Licensing and Operating Rules; Regulatory Issues

89. To encourage intensive investment in, and robust deployment of, next generation wireless networks, the Commission has adopted or proposed licensing approaches for other mid-band spectrum that are tailored to the unique needs of each band. We propose and seek comment on service-specific rules for the 3.45-3.55 GHz band, including eligibility, mobile spectrum holdings policies, license term, performance requirements, renewal term construction obligations, and other licensing and operating rules. In addressing these issues, commenters should discuss the costs and benefits associated with these proposals and any alternatives that commenters propose.

90. In the *3.7 GHz Service Order*, the Commission adopted rules to license the spectrum under its flexible use, part 27 rules, which permit licensees to provide any fixed or mobile service consistent with the permitted allocations, subject to rules necessary to prevent or minimize harmful interference.

91. We seek comment generally on the appropriate approach or combination of approaches to encourage investment, promote efficient spectrum use, and facilitate robust deployment in the band. In general, we propose to align the licensing and operating rules for the 3.45-3.55 GHz band with the rules adopted in the 3.7-4.2 GHz band, but also seek comment on alternative or different approaches. We seek specific comment on aspects of this approach below.

92. *Eligibility.*—We propose to adopt an open eligibility standard for licenses in the 3.45-3.55 GHz band, consistent with established Commission practice.¹³⁸ An open eligibility standard for the

¹³⁸ The Commission has determined in a number of services that eligibility restrictions on licenses may be imposed only when open eligibility would pose a significant likelihood of substantial harm to competition in specific markets and when an eligibility restriction would be effective in eliminating that harm. This approach relies on market forces absent a compelling showing that regulatory intervention to exclude potential participants is necessary. *See, e.g., Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands*, Report and Order and Order of Proposed Modification, 27 FCC Rcd 16102, 16193, paras. 241-42 (2012); *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, WT Docket No. 06-150 *et al.*, Second Report and Order, 22 FCC Rcd 15289, 15381, 15383-84, paras. 253, 256 (2007) (*700 MHz Second Report and Order*); *Allocations and Service*

(continued....)

licensing of the 3.45-3.55 GHz band should encourage the development of new technologies, products, and services, while helping to ensure efficient use of this spectrum.¹³⁹ We seek comment on this assumption. We note that an open eligibility approach would not affect citizenship, character, or other generally applicable qualifications that may apply under our rules.¹⁴⁰ Commenters should discuss the costs and benefits of the open eligibility proposal on competition, innovation, and investment. We propose to apply the ineligibility provision which provides that 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.”¹⁴¹

93. *Mobile Spectrum Holding Policies.*—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.¹⁴² We seek comment generally on whether and how to address any mobile spectrum holdings issues involving 3.45-3.55 GHz band spectrum to meet our statutory requirements and to ensure competitive access to the band. Similar to the Commission’s approach in the *2017 Spectrum Frontiers Order and FNPRM* and the *1675-1680 MHz NPRM*, we propose not to adopt a pre-auction, bright line limit on the ability of any entity to acquire spectrum in the 3.45-3.55 GHz band through competitive bidding.¹⁴³ We are not inclined to adopt such limits absent a clear showing that they are necessary to address a specific competitive concern; such pre-auction limits may restrict unnecessarily the ability of entities to participate in and acquire spectrum in an auction. We seek comment on any specific concerns of this type.

94. We also seek comment on whether this band should be included in the Commission’s spectrum screen, which helps to identify markets that may warrant further competitive analysis, for evaluating proposed secondary market transactions. We seek comment on reviewing holdings on a case-by-case basis when long-form applications for initial licenses are filed to ensure that the public interest benefits of having a spectrum screen applicable to secondary market transactions are not rendered ineffective. And, we seek comment on whether and how the similarity of this spectrum to spectrum currently included in the screen should be factored into our analysis, including its suitability for use in the provision of mobile telephony or broadband services. Commenters should discuss and quantify any costs

(Continued from previous page)

Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands, WT Docket No. 02-146, Report and Order, 18 FCC Rcd 23318, 23346-47, para. 70 (2003).

¹³⁹ See 47 U.S.C. § 309(j)(3).

¹⁴⁰ *Id.* §§ 301, 308(b), 310.

¹⁴¹ See 47 CFR § 27.12(b) (citing 47 U.S.C. § 1404(c)).

¹⁴² 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. See 47 U.S.C. §§ 303(g), 307, 308(b), 310. 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. *Id.* § 309(j)(3). In addition, section 6404 of the Spectrum Act recognizes the Commission’s authority “to adopt and enforce rules of general applicability, including rules concerning spectrum aggregation that promote competition.” Spectrum Act § 6404.

¹⁴³ See *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services et al.*, GN Docket No. 14-177 et al., Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, 32 FCC Rcd 10988, 11009-11011, paras. 70-74 (2017) (*2017 Spectrum Frontiers Order and FNPRM*); *1675 NPRM*, 34 FCC Rcd at 3564, para. 31.

and benefits associated with any proposals on the applicability of mobile spectrum holdings policies to 3.45-3.55 GHz band spectrum.

95. *Geographic License Area.*—Considering the opportunity presented here to align the 3.45-3.55 GHz band with other mid-band spectrum, we seek comment on the appropriate geographic license area for the band to best facilitate robust band use. In determining the appropriate geographic license size, the Commission must consider several factors, including: (1) facilitating access to spectrum by both small and large providers; (2) providing for the efficient use of spectrum; (3) encouraging deployment of wireless broadband services to consumers, especially those in rural areas and Tribal lands; and (4) promoting investment in and rapid deployment of new technologies and services.¹⁴⁴ In light of these statutory considerations, we propose to issue flexible use licenses on a Partial Economic Area (PEA) basis, as we recently adopted for the 3.7 GHz Service.¹⁴⁵ We ask commenters to discuss and quantify the economic, technical, and other public interest considerations of licensing on a PEA basis, or if offering alternatives, to discuss and quantify the same considerations for that alternative. We invite commenters to discuss which set of considerations is most applicable for the circumstances of the 3.45-3.55 GHz band. Or do the considerations in this band indicate a different geographic license area is more appropriate? We ask commenters to address the costs and benefits of their recommended licensing approach.

96. We also recognize that the AMBIT study focused on licensing for the contiguous United States and we therefore propose that the states of Hawaii and Alaska and U.S. territories should be excluded from 3.45-3.55 GHz band licensing at this time. We seek comment on our proposal, including the costs and benefits. Going forward, the DoD intends to conduct additional analysis to assess the feasibility of expanding commercial access to additional areas, including Alaska and Hawaii. Pending the results of future DoD analysis, should the Commission consider extending any 3.45-3.55 GHz band regime adopted in this proceeding to additional areas at a later date? Should we delegate authority to the Wireless Telecommunications Bureau and Office of Engineering and Technology to make any future adjustments to Cooperative Planning Areas or Periodic Use Areas as they deem appropriate in consultation with NTIA and consistent with DoD analysis? In addition, we seek comment on whether there are ways to mitigate the impact of possible future licensees in the Gulf of Mexico to federal operations. Could the Commission's past experiences in licensing under similar circumstances, such as in the AWS-3 band, prove useful here?

97. *License Term.*—Given the similarity in the flexible use goal of the Commission in opening the 3.7 GHz Service and opening this spectrum to commercial use, we believe a 15-year term, as was adopted for licenses in the 3.7 GHz Service, would afford licensees sufficient time to make long-term investments in deployment. For that service, we determined that additional time was necessary for relocation of services vacating the band.¹⁴⁶ Here, a similar transition period may be necessary, given the anticipated need to coordinate federal usage of the spectrum with affected licensees under circumstances that may be particular to each licensee's individual situation. We seek comment on the appropriate license term for flexible use licenses in the 3.45-3.55 GHz band and on the costs and benefits of this

¹⁴⁴ See e.g., *Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands*, Report and Order, 18 FCC Rcd 25162, 25174, para. 31 (2003) (*AWS-1 Service Rules R&O*); see also 47 U.S.C. § 309(j).

¹⁴⁵ In the *3.7 GHz Service Order*, the Commission adopted PEAs as the license area in the contiguous United States, finding that licensing new flexible use licenses on a PEA basis would encourage entry by providers contemplating offering wireless broadband service on a localized basis, yet at the same time would not preclude carriers that plan to provide service on a much larger geographic scale. *3.7 GHz Service Order*, 35 FCC Rcd at 2379-80, paras. 77-79. The *3.7 GHz Service Order* also determined that PEAs as the license area would encourage auction participation by a diverse group of buyers and generate competition between large, regional, and small carriers across various geographic areas, while also minimizing the difficult coordination and border issues that might arise from smaller license areas. *Id.*

¹⁴⁶ *3.7 GHz Service Order*, 35 FCC Rcd at 2384-85, paras. 90-91.

proposal.¹⁴⁷ Additionally, we seek comment on whether there are alternative license terms that might be better suited for this band.¹⁴⁸ If an alternative license term is chosen, what impact would it have on investment or deployment, particularly for smaller or rural entities? We seek comment on the costs and benefits of the license term being discussed.

98. *Renewal.*—We propose to apply our general part 27 renewal requirements for wireless licenses, as in the *3.7 GHz Service Order* and the 3.5 GHz band.¹⁴⁹ We seek comment on this proposal. Commenters should address the costs and benefits of the renewal term being advocated.

99. *Performance Requirements.*—In addition to a renewal standard, the Commission also establishes performance requirements to ensure that spectrum is intensely and efficiently used.¹⁵⁰ The Commission has applied different performance and construction requirements to different spectrum bands based on considerations relevant to those bands.¹⁵¹ We continue to believe that performance requirements play a critical role in ensuring that licensed spectrum does not lie fallow and thus seek detailed comment on certain performance requirements.

100. We seek comment on the types of performance requirements that would be appropriate to encourage rapid deployment by flexible use licensees in the 3.45-3.55 GHz band. For example, in the *3.7 GHz Service Order*, we adopted specific quantifiable benchmarks for different types of operations.¹⁵² Licensees offering mobile or point-to-multipoint services are required to provide reliable signal coverage and offer service 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 to at least 80% of the population in each of their license areas within 12 years from the license issue date (second performance benchmark).¹⁵³ Licensees providing fixed service must demonstrate within eight years of the license issue date (first performance benchmark) that they have four links operating and providing service, if the population within the license area is equal to or less than 268,000.¹⁵⁴ If the population within the license area is greater than 268,000, a licensee relying on point-to-point service must demonstrate that it has at least one link in operation and providing service, either to customers or for internal use, per every 67,000 persons within a license

¹⁴⁷ The Communications Act does not specify a term limit for wireless radio services licenses. The only statutory limit on license terms is eight years for licenses in the broadcast services. See 47 U.S.C. § 307(c)(1); see also 47 CFR § 73.1020(a).

¹⁴⁸ See, e.g., 47 CFR § 27.14(k) (AWS-3 licenses have a 12-year initial license terms and 10-year renewal terms), (l) (600 MHz band licenses have 12-year initial license terms and 10-year renewal terms).

¹⁴⁹ 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*); *3.7 GHz Service Order*, 35 FCC Rcd at 2390, para. 106; *3.5 GHz Order*, 33 FCC Rcd at 10628-29, para. 55.

¹⁵⁰ See 47 U.S.C. § 309(j).

¹⁵¹ See, e.g., *Service Rules for Advanced Wireless Services H Block—Implementing Section 6401 of the Middle Class Tax Relief and Job Creation Act of 2012 Related to the 1915-1920 MHz and 1995-2000 MHz Bands*, Report and Order, 28 FCC Rcd 9483, 9558-59, para. 195 (2013) (requiring 40% population coverage within four years of initial grant and 75% population coverage within 10 years of initial grant). See also *AWS-3 Report and Order*, 29 FCC Rcd at 4659-60, para. 135 (requiring 40% population coverage within six years of initial grant and 75% population coverage within 12 years of initial grant); *Expanding the Economic and Innovation Opportunities of Spectrum through Incentive Auctions*, Report and Order, 29 FCC Rcd 6567, 6877-78, para. 764 (2014) (*Incentive Auctions Report and Order*).

¹⁵² *3.7 GHz Service Order*, 35 FCC Rcd 2343, 2385-89, paras. 93-103.

¹⁵³ *Id.*, 35 FCC Rcd at 2385, para. 93.

¹⁵⁴ *Id.*, 35 FCC Rcd at 2388, paras. 99-100.

area.¹⁵⁵ We require licensees relying on point-to-point service to demonstrate within 12 years of the license issue date (final performance benchmark) that they 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 268,000.¹⁵⁶ If the population within the license area is greater than 268,000, we require a licensee relying on point-to-point service to demonstrate it is providing service and has at least two links in operation per every 67,000 persons within a license area.¹⁵⁷ Would these metrics be appropriate in the 3450-3550 MHz band? If not, why? And how should they be adjusted?

101. For the 3.7 GHz Service, we also adopted alternate Internet of Things (IoT) performance requirements in order to allow for flexibility to provide services potentially less suited to a population coverage metric.¹⁵⁸ Specifically, licensees providing IoT-type services thus have flexibility to demonstrate that they offer geographic area coverage of 35% of the license area at the first (eight-year) performance benchmark, and geographic area coverage of 65% of the license area at the second (12-year) performance benchmark.¹⁵⁹ Is it appropriate to adopt this—or a different—IoT metric here?

102. We seek comment on these types of requirements and any other requirements to achieve our goal of ensuring spectrum use. Commenters should discuss the appropriate metric to accommodate such service offerings or other innovative services in the 3.45-3.55 GHz band, as well as the costs and benefits of an alternative approach.

103. *Failure to Meet Performance Requirements.*—Along with performance benchmarks, we seek to adopt meaningful and enforceable penalties for failing to meet the benchmarks. We seek comment on which penalties will most effectively ensure timely build-out.

104. We propose that, in the event a 3.45-3.55 GHz band licensee's authority to operate terminates, its spectrum rights should become available for reassignment pursuant to the competitive bidding provisions of section 309(j). We also seek comment on whether, consistent with the Commission's rules for other part 27 licenses, we should require that any 3.45-3.55 GHz band flexible use licensee that forfeits its license for failure to meet its performance requirements be precluded from regaining that license.¹⁶⁰ Finally, we seek comment on other performance requirements and enforcement mechanisms that would effectively ensure timely buildout.

105. *Compliance Procedures.*—We propose a rule requiring 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. Our proposal is consistent with the compliance procedures adopted in the *3.7 GHz Service Order*, in addition to compliance procedures applicable to all part 27 licensees, including the filing of electronic coverage maps and supporting documentation.¹⁶¹ If a licensee does not provide reliable signal coverage to an entire license area, we propose that it must provide a map that accurately depicts the boundaries of the area or areas within each license area that are not being served. We further propose that 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

¹⁵⁵ *3.7 GHz Service Order*, 35 FCC Rcd at 2388, paras. 99-100.

¹⁵⁶ *Id.*

¹⁵⁷ *Id.*

¹⁵⁸ *Id.*

¹⁵⁹ *Id.*, 35 FCC Rcd at 2387, para. 97.

¹⁶⁰ 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.

¹⁶¹ *See* 47 CFR §§ 1.946(d); 27.14(k); *3.7 GHz Service Order*, 35 FCC Rcd at 2390, paras. 104-106.

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 seek comment on this approach. Would such procedures confirm that the spectrum is being used consistently with the performance requirements? We seek comment on this assumption. We also seek comment on whether small entities face any special or unique issues with respect to the transition such that they would require additional time to comply.

106. *Applicability of Other Part 27 Rules.*—In establishing service rules for similar bands, we have sought to afford licensees the flexibility to align licenses with other spectrum bands governed by part 27 of the Commission's rules. We therefore propose that licensees in the 3.45-3.55 GHz band should be governed by licensing and operating rules that are applicable to all part 27 services,¹⁶² including regulatory status,¹⁶³ foreign ownership reporting,¹⁶⁴ compliance with construction requirements,¹⁶⁵ permanent discontinuance of operations,¹⁶⁶ partitioning and disaggregation,¹⁶⁷ and spectrum leasing.¹⁶⁸ We ask commenters to identify any aspects of our general part 27 service rules that should be modified to accommodate the particular characteristics of the 3.45-3.55 GHz band. Are there reasons that flexible use licensees in this band should *not* be subject to these general part 27 requirements? We ask proponents of the various mechanisms described above whether there are issues specific to this section and their preferred approach. We also ask commenters that support modifying certain part 27 rules as applied to licensees in the 3.45-3.55 GHz band to articulate the reasons why different treatment here is justified.

H. Competitive Bidding Procedures

107. We propose to assign the licenses through a system of competitive bidding.¹⁶⁹ Consistent with the competitive bidding procedures the Commission has used in previous auctions, we propose to conduct any auction for licenses for spectrum in the band in conformity with the part 1, subpart Q general competitive bidding rules, subject to any modification of the part 1 rules that the Commission may adopt in the future.¹⁷⁰ We seek comment on whether any of these rules would be inappropriate or should be modified for an auction of licenses in this band.¹⁷¹ We seek comment on the costs and benefits of these proposals.

108. 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

¹⁶² We note the Commission recently amended several of the rules applicable to part 27 services. *See Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal et al.*, 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*).

¹⁶³ 47 CFR § 27.10.

¹⁶⁴ 47 U.S.C. § 310; 47 CFR § 27.12.

¹⁶⁵ 47 CFR § 27.14(k)

¹⁶⁶ *Id.* § 1.953.

¹⁶⁷ *Id.* § 1.950.

¹⁶⁸ *Id.* §§ 1.9001 *et seq.*

¹⁶⁹ 47 U.S.C. § 309(j)(1).

¹⁷⁰ 47 CFR §§ 1.2101-1.2114.

¹⁷¹ Consistent with our longstanding approach, we will initiate a public notice process to solicit public input on certain details of auction design and the auction procedures.

sharing their operations.¹⁷² 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.¹⁷³ Based on the current use of the 3.45-3.55 GHz band by the DoD and 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, we propose to set the reserve price for any auction of 3.45-3.55 GHz band licenses at 110% of expected federal relocation costs, based on the estimate of relocation costs provided to the Commission by NTIA under the CSEA.¹⁷⁴

109. We also propose to make bidding credits for designated entities available for this band and seek comment on this proposal. If we decide to offer small business bidding credits, we seek comment on how to define a small business. In recent years, for other flexible use licenses, we have adopted bidding credits for the two larger designated entity business sizes provided in the Commission’s part 1 standardized schedule of bidding credits.¹⁷⁵ We propose to use the same definitions here. Accordingly, we propose to define a small business as an entity with average gross revenues for the preceding five years not exceeding \$55 million, and a very small business as an entity with average gross revenues for the preceding five years not exceeding \$20 million.¹⁷⁶ A qualifying “small business” would be eligible for a bidding credit of 15% and a qualifying “very small business” would be eligible for a bidding credit of 25%.¹⁷⁷ We also seek comment on whether the characteristics of these frequencies and our proposed licensing model suggest that we should adopt different small business size standards and associated bidding credits than we have in the past. Finally, we seek comment on whether we should offer rural service providers a designated entity bidding credit for licenses in this band. We propose to

¹⁷² 47 U.S.C. § 923(g)(1)-(2). The Commission notified NTIA of its plan to auction licenses in 100 megahertz of the 3400-3550 MHz band beginning in December 2021. *See* Letter from Ronald Repasi, Acting Chief, Office of Engineering and Technology, FCC, to Douglas Kinkoph, Associate Administrator of the Office of Telecommunications and Information Applications, June 12, 2020.

¹⁷³ 47 U.S.C. § 309(j)(3)(F).

¹⁷⁴ 47 U.S.C. § 923(g)(3).

¹⁷⁵ *See Incentive Auctions Report and Order*, 29 FCC Rcd at 6762, para. 475; *Updating Part 1 R&O*, 30 FCC Rcd at 7524-25, para. 74, 7528, para. 83 (adopting revised small business size standards for auctions of licenses in the 600 MHz Band); *Spectrum Frontiers Report and Order*, 31 FCC Rcd at 8099-8100, paras. 249-50 (adopting small business size standards for auctions of licenses in the Upper Microwave Flexible Use Service); 47 CFR § 1.2110(f)(2)(i)(A)(C) (defining small business entities using average gross revenues thresholds of \$4 million, \$20 million, and \$55 million). While the Commission is not required to adopt bidding credits for a particular service, the Part 1 rules provide that the Commission may do so by adopting small business or rural service provider bidding credits in the service-specific rules for a band. *Id.* § 1.2110(f)(1). Any caps with respect to available bidding credits are adopted on an auction-by-auction basis. *Id.* §§ 1.2110(f)(2)(ii) (cap on designated entity bidding discount), 1.2110(f)(4)(ii) (cap on rural service provider discount).

¹⁷⁶ 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); *see* 13 CFR § 121.903(a)(1)(ii). For consistency with the statutory requirements, 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.

¹⁷⁷ 47 CFR § 1.2110(f)(2)(i).

offer rural service providers a bidding credit of 15% under our rules,¹⁷⁸ consistent with our approach in other similar flexible use bands.¹⁷⁹ Commenters addressing these proposals or advocating for any alternatives should consider what details of licenses in the band may affect whether designated entities will apply for them.

V. PROCEDURAL MATTERS

110. *Ex Parte Presentations.* The proceeding shall be treated as a “permit-but-disclose” proceeding in accordance with the Commission’s *ex parte* rules.¹⁸⁰ 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.

111. *Comment Period and Filing Procedures.* Pursuant to sections 1.415 and 1.419 of the Commission’s rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using the Commission’s Electronic Comment Filing System (ECFS). *See Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- 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.
 - Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9050 Junction Drive, Annapolis Junction, MD 20701.
 - U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington, DC 20554.

¹⁷⁸ *Id.* § 1.2110(f)(4)(i) (bidding credit of 15 percent for applicants meeting the requirements for being designated as a rural service provider). To be eligible to receive a rural service provider bidding credit, an applicant must meet the requirements set forth in Part 1. An applicant eligible for both small business bidding credits and rural service provider bidding credits may only receive one of the two credits. *Id.* §§ 1.2110(f)(2)(i), (4)(i).

¹⁷⁹ *3.7 GHz Service Order*, 35 FCC Rcd at 2376, para. 69; *3.5 GHz Order*, 33 FCC Rcd at 10647, para. 90.

¹⁸⁰ *Id.* §§ 1.1200 *et seq.*

- 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.¹⁸¹

112. **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).

113. **Availability of Documents.** Comments, reply comments, and *ex parte* submissions will be available for public inspection during regular business hours in the FCC Reference Center, Federal Communications Commission, 445 12th Street, S.W., Room CY-A257, Washington, D.C. These documents will also be available via ECFS. Documents will be available electronically in ASCII, Microsoft Word, and/or Adobe Acrobat.

114. **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. We have also prepared an Initial Regulatory Flexibility Analysis (IRFA) concerning the potential impact of rule and policy change proposals on small entities in the Further Notice of Proposed Rulemaking. The IRFA is set forth in Appendix E.

115. **Paperwork Reduction Act Analysis.** This *Report and Order* does not contain new or modified information collection requirements subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. In addition, therefore, 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).

116. In addition, this *Further Notice of Proposed Rulemaking* contains proposed modified information collection requirements. The Commission, as part of its continuing effort to reduce paperwork burdens, invites the general public and the Office of Management and Budget to comment on the information collection requirements contained in this document, as required by the Paperwork Reduction Act of 1995, Public Law 104-13. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, see 44 U.S.C. 3506(c)(4)), we seek specific comment on how we might further reduce the information collection burden for small business concerns with fewer than 25 employees.

¹⁸¹ See *Amendment of the Commission’s Rules of Practice and Procedure*, Order, DA 20-562 (OMD 2020).

117. *Congressional Review Act.*—The Commission will submit this draft Report and Order and Further Notice of Proposed Rulemaking to the Administrator of the Office of Information and Regulatory Affairs, Office of Management and Budget, for concurrence as to whether this rule is “non-major” under the Congressional Review Act, 5 U.S.C. § 804(2). The Commission will send a copy of this Report and Order and Further Notice of Proposed Rulemaking to Congress and the Government Accountability Office pursuant to 5 U.S.C. § 801(a)(1)(A).

118. *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.

VI. ORDERING CLAUSES

119. IT IS ORDERED, pursuant to sections 1, 4(i), 157, 301, 303, 307, 308, 309, 310, and 316, of the Communications Act of 1934, as amended, as well as 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, and 1502, that this Report and Order and Further Notice of Proposed Rulemaking IS ADOPTED.

120. IT IS FURTHER ORDERED that the amendments of parts 1, 2, 90, and 97 of the Commission’s rules, as set forth in Appendix A, ARE ADOPTED, effective thirty (30) days after publication in the Federal Register.

121. IT IS FURTHER ORDERED that the Commission’s Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this Report and Order and Further Notice of Proposed Rulemaking, including the Final and Initial Regulatory Flexibility Analyses, to the Chief Counsel for Advocacy of the Small Business Administration.

122. IT IS FURTHER ORDERED that the Commission SHALL SEND a copy of this Report and Order in a report to be sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act, *see* 5 U.S.C. § 801(a)(1)(A).

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A**Final Rules**

The Federal Communications Commission amends 47 CFR parts 1, 2, 90, and 97 to read as follows:

PART 1 – PRACTICE AND PROCEDURE

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

AUTHORITY: [To be inserted]

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

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

AUTHORITY: [To be inserted].

3. Section 2.106, the Table of Frequency Allocations, is amended as follows:

- a. Revise pages 40 and 41.
- b. In the list of United States (US) Footnotes, revise footnote US108.

The revisions read as follows:

§ 2.106 Table of Frequency Allocations.

The revisions read as follows:

* * * * *

* This document has been circulated for tentative consideration by the Commission at its September 30, 2020 open meeting. The issues referenced in this document and the Commission's ultimate resolution of those issues remain under consideration and subject to change. This document does not constitute any official action by the Commission. However, the Chairman has determined that, in the interest of promoting the public's ability to understand the nature and scope of issues under consideration, the public interest would be served by making this document publicly available. The FCC's *ex parte* rules apply and presentations are subject to "permit-but-disclose" *ex parte* rules. *See, e.g.,* 47 C.F.R. §§ 1.1206, 1.1200(a). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules, including the general prohibition on presentations (written and oral) on matters listed on the Sunshine Agenda, which is typically released a week prior to the Commission's meeting. *See* 47 CFR §§ 1.1200(a), 1.1203.

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 2690-2700 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive)	5.149	5.149	US205	US385	
5.340 5.422 2700-2900 AERONAUTICAL RADIONAVIGATION 5.337 Radiolocation			US246		
5.423 5.424 2900-3100 RADIOLOCATION 5.424A RADIONAVIGATION 5.426			2700-2900 METEOROLOGICAL AIDS AERONAUTICAL RADIONAVIGATION 5.337 US18 Radiolocation G2	2700-2900	Aviation (87)
5.425 5.427 3100-3300 RADIOLOCATION Earth exploration-satellite (active) Space research (active)			5.423 G15 2900-3100 RADIOLOCATION 5.424A G56 MARITIME RADIONAVIGATION	5.423 US18 2900-3100 MARITIME RADIONAVIGATION Radiolocation US44	Maritime (80) Private Land Mobile (90)
5.149 5.428 3300-3400 RADIOLOCATION	3300-3400 RADIOLOCATION Amateur Fixed Mobile	3300-3400 RADIOLOCATION Amateur	5.427 US44 US316 3100-3300 RADIOLOCATION G59 Earth exploration-satellite (active) Space research (active)	5.427 US316 3100-3300 Earth exploration-satellite (active) Space research (active) Radiolocation	Private Land Mobile (90)
5.149 5.429 5.429A 5.429B 5.430 3400-3600 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.430A Radiolocation	5.149 5.429C 5.429D	5.149 5.429 5.429E 5.429F	US342 3300-3500 RADIOLOCATION US108 G2	US342 3300-3500	
5.431	3400-3500 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.431A 5.431B Amateur Radiolocation 5.433	3400-3500 FIXED FIXED-SATELLITE (space-to-Earth) Amateur Mobile 5.432 5.432B Radiolocation 5.433	5.282 5.432A	US108 US342	

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	
(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	3500-3550	
			3550-3650 RADIOLOCATION G59 AERONAUTICAL RADIONAVIGATION (ground-based) G110	3550-3600 FIXED MOBILE except aeronautical mobile US105 US433	Citizens Broadband (96)
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	US105 US107 US245 US433	3600-3650 FIXED FIXED-SATELLITE (space-to-Earth) US107 US245 MOBILE except aeronautical mobile US105 US433	Satellite Communications (25) Citizens Broadband (96)
		5.435	3650-3700	3650-3700 FIXED FIXED-SATELLITE (space-to-Earth) NG169 NG185 MOBILE except aeronautical mobile US109 US349	
	3700-4200 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile		3700-4200	3700-4000 FIXED MOBILE except aeronautical mobile NG182 NG457A	Wireless Communications (27)
				4000-4200 FIXED FIXED-SATELLITE (space-to-Earth) NG457A NG182	Satellite Communications (25)
4200-4400 AERONAUTICAL MOBILE (R) 5.436 AERONAUTICAL RADIONAVIGATION 5.438 5.437 5.439 5.440			4200-4400 AERONAUTICAL RADIONAVIGATION		Aviation (87)
4400-4500 FIXED MOBILE 5.440A			5.440 US261	4400-4500	
4500-4800 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 MOBILE 5.440A				4500-4800 FIXED-SATELLITE (space-to-Earth) 5.441 US245	
4800-4990 FIXED MOBILE 5.440A 5.441A 5.441B 5.442 Radio astronomy			US113 US245 US342	4800-4940 US113 US342	
5.149 5.339 5.443			4940-4990	4940-4990 FIXED MOBILE except aeronautical mobile	Public Safety Land Mobile (90Y)
4990-5000 FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY Space research (passive)			5.339 US342 US385 G122	5.339 US342 US385	
			4990-5000 RADIO ASTRONOMY US74 Space research (passive)		

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UNITED STATES (US) FOOTNOTES

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US108 In the band 3300-3500 MHz, notwithstanding removal of the non-federal allocations from these bands in [insert FCC item number], secondary non-federal radiolocation and secondary amateur license holders operating as of [insert the effective date the Commission’s Report and Order] may continue to operate on a secondary basis while the Commission finalizes plans to reallocate spectrum in the 3.45-3.55 GHz band. Authorization for these operations will sunset on a future date certain, consistent with the first possible grant of flexible use authorizations to new users in that portion of the band. The date by which non-Federal stations in these services will be required to cease operations in the band 3300-3550 MHz will be set by the Commission in a subsequent decision in its proceeding. 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.

* * * * *

PART 90—PRIVATE LAND MOBILE RADIO SERVICES

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

AUTHORITY: [To be inserted]

5. In § 90.103, revise the table in paragraph (b) by removing the entries for the “3300 to 3500” MHz and “3500 to 3550” MHz bands to read as follows:

§ 90.103 Radiolocation Service.

* * * * *

(b) * * *

RADIOLOCATION SERVICE FREQUENCY TABLE

Frequency or band	Class of station(s)	Limitation
* * *	* *	* *
Megahertz		
* * *	* *	* *
3100 to 3300do	12
3550 to 3650do	30
* * *	* *	* *

* * * * *

PART 97—AMATEUR RADIO SERVICE

6. The authority citation for part 97 continues to read as follows:

AUTHORITY: [To be inserted]

7. Revise Section 97.207 to read as follows:

§ 97.207 Space station.

* * * * *

(c) * * *

(2) The 7.0-7.1 MHz, 14.00-14.25 MHz, 144-146 MHz, 435-438 MHz, 2400-2450 MHz, 5.83-5.85 GHz, 10.45-10.50 GHz, and 24.00-24.05 GHz segments.

* * * * *

8. Revise Section 97.209 to read as follows:

§ 97.209 Earth station.

* * * * *

(b) * * *

(2) The 7.0-7.1 MHz, 14.00-14.25 MHz, 144-146 MHz, 435-438 MHz, 1260-1270 MHz and 2400-2450 MHz, 5.65-5.67 GHz, 10.45-10.50 GHz and 24.00-24.05 GHz segments.

9. Revise Section 97.211 to read as follows:

§ 97.211 Space telecommand station.

* * * * *

(c) * * *

(2) The 7.0-7.1 MHz, 14.00-14.25 MHz, 144-146 MHz, 435-438 MHz, 1260-1270 MHz and 2400-2450 MHz, 5.65-5.67 GHz, 10.45-10.50 GHz and 24.00-24.05 GHz segments.

* * * * *

10. In § 97.301, revise the table in paragraph (a) to read as follows:

§ 97.301 Authorized frequency bands.

* * * * *

(a) * * *

Wavelength band	ITU Region 1	ITU Region 2	ITU Region 3	Sharing requirements <i>see §97.303</i> (paragraph)
VHF	MHz	MHz	MHz	
6 m	-	50-54	50-54	(a)
2 m	144-146	144-148	144-148	(a), (k)
1.25 m	-	219-220	-	(l)
Do	-	222-225	-	(a)
UHF	MHz	MHz	MHz	
70 cm	430-440	420-450	430-440	(a), (b), (m)
33 cm	-	902-928	-	(a), (b), (e), (n)
23 cm	1240-1300	1240-1300	1240-1300	(b), (d), (o)
13 cm	2300-2310	2300-2310	2300-2310	(d), (p)
Do	2390-2450	2390-2450	2390-2450	(d), (e), (p)

SHF	GHz	GHz	GHz	
5 cm	5.650-5.850	5.650-5.925	5.650-5.850	(a), (b), (e), (r)
3 cm	10.0-10.5	10.0-10.5	10.0-10.5	(a), (b), (k)
1.2 cm	24.00-24.25	24.00-24.25	24.00-24.25	(b), (d), (e)
EHF	GHz	GHz	GHz	
6 mm	47.0-47.2	47.0-47.2	47.0-47.2	
4 mm	76-81	76-81	76-81	(c), (f), (s)
2.5 mm	122.25-123.00	122.25-123.00	122.25-123.00	(e), (t)
2 mm	134-141	134-141	134-141	(c), (f)
1 mm	241-250	241-250	241-250	(c), (e), (f)
	Above 275	Above 275	Above 275	(f)

11. In § 97.303, revise paragraphs (b) and (f) and remove and reserve paragraph (q) to read as follows:

§ 97.303 Frequency sharing requirements.

* * * * *

(b) Amateur stations transmitting in the 70 cm band, the 33 cm band, the 23 cm band, the 5 cm band, the 3 cm band, or the 24.05-24.25 GHz segment must not cause harmful interference to, and must accept interference from, stations authorized by the United States Government in the radiolocation service.

* * * * *

(f) Amateur stations transmitting in the following segments must not cause harmful interference to radio astronomy stations: 76-81 GHz, 136-141 GHz, 241-248 GHz, 275-323 GHz, 327-371 GHz, 388-424 GHz, 426-442 GHz, 453-510 GHz, 623-711 GHz, 795-909 GHz, or 926-945 GHz. In addition, amateur stations transmitting in the following segments must not cause harmful interference to stations in the Earth exploration-satellite service (passive) or the space research service (passive): 275-286 GHz, 296-306 GHz, 313-356 GHz, 361-365 GHz, 369-392 GHz, 397-399 GHz, 409-411 GHz, 416-434 GHz, 439-467 GHz, 477-502 GHz, 523-527 GHz, 538-581 GHz, 611-630 GHz, 634-654 GHz, 657-692 GHz, 713-718 GHz, 729-733 GHz, 750-754 GHz, 771-776 GHz, 823-846 GHz, 850-854 GHz, 857-862 GHz, 866-882 GHz, 905-928 GHz, 951-956 GHz, 968-973 GHz and 985-990 GHz.

* * * * *

(q) [Reserved]

* * * * *

12. In § 97.305, revise the SHF portion of the table in paragraph (c) by removing the entry for the 9 cm band to read as follows.

§ 97.305 Authorized emission types.

* * * * *

(c) * * *

Wavelength	Frequencies	Emission types authorized	Standards see §97.307(f),
-------------------	--------------------	----------------------------------	----------------------------------

Band			paragraph:
* *	*	*	*
SHF:			
5 cm	Entire band	MCW, phone, image, RTTY, data, SS, test, pulse	(7), (8), and (12).
3 cm	Entire band	MCW, phone, image, RTTY, data, SS, test	(7), (8), and (12).
1.2 cm	Entire band	MCW, phone, image, RTTY, data, SS, test, pulse	(7), (8), and (12).
* *	*	*	*

APPENDIX B

Final Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),¹⁸² an Initial Regulatory Flexibility Analysis (IRFA) was incorporated in the *Notice of Proposed Rulemaking (Notice)* released in December 2019.¹⁸³ The Commission sought written public comment on the proposals in the *Notice*, including comment on the IRFA.¹⁸⁴ No comments were filed addressing the IRFA. This present Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.¹⁸⁵

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

2. The Report and Order (*Report and Order*) adopted by the Commission today continues the Commission's efforts to expand access to mid-band spectrum for flexible use licenses. It removes the secondary allocations for non-federal radiolocation and amateur operations for the 3.3-3.55 GHz band in preparation for auctioning parts of this band for flexible use. This change will ensure that the spectrum auctioned subject to rules adopted in the future will be clear of secondary users, allowing it to be used efficiently for important uses such as broadband Internet access and 5G by future licensees. This action is also 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 feasibility of allowing commercial wireless services to share use of spectrum between 3.1 and 3.55 GHz.¹⁸⁶ Moreover, the Commission's decision to delete the non-federal secondary allocations from the 3.3-3.55 GHz band in the Table of Frequency Allocations is an important initial step towards satisfying Congress's directives. 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 presents an opportunity to make a large contiguous block of mid-band spectrum available. Collectively, the 3.45-3.55 GHz band and neighboring 3.5 GHz and 3.7 GHz bands could offer 530 megahertz of mid-band spectrum for flexible use.

3. Incumbent non-federal radiolocation services and non-federal amateur allocations currently operating in the 3.3-3.55 GHz band will be moved from the 3.3-3.55 GHz band to other spectrum already allocated for these operations. More specifically, non-federal radiolocation operations will be moved to the 2.9-3.0 GHz band and will continue to operate on a secondary basis to federal operations. Amateur operators have sufficient alternative bands for their operations, therefore these licensees will be permitted to relocate themselves to the existing amateur spectrum most appropriate for their operations. Amateur operations will be subject to the existing rules of the new band they occupy. Experimental licenses, including special temporary authorizations (STAs), that are active throughout the 3.1-3.55 GHz band at any given time, will be permitted to operate in the 3.3-3.55 GHz band on a non-interference basis, as they are in other licensed bands. Our actions in the *Report and Order* to clear 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

¹⁸² 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).

¹⁸³ *Facilitating Shared Use in the 3.1-3.55 GHz Band*, WT Docket No. 19-348, Notice of Proposed Rulemaking, 34 FCC Rcd 12662 Appendix B, Paras. 1-16 (2019) (*3.1-3.55 GHz NPRM*).

¹⁸⁴ See 5 U.S.C. § 603(a).

¹⁸⁵ See 5 U.S.C. § 604.

¹⁸⁶ 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).

spectrum for these secondary operations, and will prevent harmful interference between these operations and those pursuant to flexible use licenses in the new 3.45-3.55 GHz band.

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

4. 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

5. 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.¹⁸⁷

6. 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

7. The RFA directs agencies to provide a description of, and where feasible, an estimate of the number of small entities that may be affected by rules adopted herein.¹⁸⁸ The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”¹⁸⁹ In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.¹⁹⁰ A “small business concern” is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA).¹⁹¹

8. *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.¹⁹² 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.¹⁹³ These types of small businesses represent 99.9 percent of all businesses in the United States, which translates to 30.7 million businesses.¹⁹⁴

¹⁸⁷ 5 U.S.C. § 604 (a)(3).

¹⁸⁸ 5 U.S.C. § 604(a)(4).

¹⁸⁹ 5 U.S.C. § 601(6).

¹⁹⁰ 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.”

¹⁹¹ 15 U.S.C. § 632.

¹⁹² See 5 U.S.C. § 601(3)-(6).

¹⁹³ 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).

¹⁹⁴ *Id.*

9. 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.”¹⁹⁵ 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.¹⁹⁶ 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.¹⁹⁷

10. 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.”¹⁹⁸ U.S. Census Bureau data from the 2017 Census of Governments¹⁹⁹ indicate that there were 90,075 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States.²⁰⁰ Of this number there were 36,931 general purpose governments (county²⁰¹, municipal and town or township²⁰²) with populations of less than 50,000 and 12,040 special purpose governments - independent school districts²⁰³

¹⁹⁵ 5 U.S.C. § 601(4).

¹⁹⁶ 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.

¹⁹⁷ *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-ao-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.

¹⁹⁸ 5 U.S.C. § 601(5).

¹⁹⁹ *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>.

²⁰⁰ *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) and special purpose governments (special districts and independent school districts). *See also* Table 2. CG1700ORG02 Table Notes_Local Governments by Type and State_2017.

²⁰¹ *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.

²⁰² *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.

²⁰³ *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

(continued....)

with enrollment populations of less than 50,000.²⁰⁴ 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.”²⁰⁵

11. *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.

12. *Fixed Microwave Services*. Microwave services include common carrier,²⁰⁶ private-operational fixed,²⁰⁷ and broadcast auxiliary radio services.²⁰⁸ They also include the Upper Microwave Flexible Use Service²⁰⁹, Millimeter Wave Service²¹⁰, Local Multipoint Distribution Service (LMDS),²¹¹ the Digital Electronic Message Service (DEMS),²¹² and the 24 GHz Service,²¹³ where licensees can choose between common carrier and non-common carrier status.²¹⁴ 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.²¹⁵ 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)²¹⁶ and the

(Continued from previous page) _____
State Census Years 1942 to 2017 [CG1700ORG04], CG1700ORG04 Table Notes_Special Purpose Local Governments by State_Census Years 1942 to 2017.

²⁰⁴ 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.

²⁰⁵ 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.

²⁰⁶ See 47 CFR Part 101, Subparts C and I.

²⁰⁷ See 47 CFR Part 101, Subparts C and H.

²⁰⁸ 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.

²⁰⁹ See 47 CFR Part 30.

²¹⁰ See 47 CFR Part 101, Subpart Q.

²¹¹ See 47 CFR Part 101, Subpart L.

²¹² See 47 CFR Part 101, Subpart G.

²¹³ See *id.*

²¹⁴ See 47 CFR §§ 101.533, 101.1017.

²¹⁵ These statistics are based on a review of the Universal Licensing System on September 22, 2015.

²¹⁶ 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>.

appropriate size standard for this category under SBA rules is that such a business is small if it has 1,500 or fewer employees.²¹⁷ For this industry, U.S. Census Bureau data for 2012 show that there were 967 firms that operated for the entire year.²¹⁸ Of this total, 955 firms had employment of 999 or fewer employees and 12 had employment of 1000 employees or more.²¹⁹ 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.

13. 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.

14. *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).²²⁰ 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.²²¹ The SBA has established a size standard for this industry as all such firms having 750 or fewer employees.²²² U.S. Census Bureau data for 2012 show that 383 establishments operated in that year.²²³ Of that number, 379 operated with fewer than 500 employees and 4 had 500 to 999 employees.²²⁴ Based on this data, we conclude that the majority of Other Communications Equipment Manufacturers are small.

15. *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.²²⁵ Examples of products made by these

²¹⁷ See 13 CFR § 121.201, NAICS Code 517312 (previously 517210).

²¹⁸ 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>.

²¹⁹ *Id.* Available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees. The largest category provided is for firms with "1000 employees or more."

²²⁰ 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>.

²²¹ *Id.*

²²² See 13 CFR 121.201, NAICS Code 334290.

²²³ 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>.

²²⁴ *Id.*

²²⁵ 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>.

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.²²⁶ The SBA has established a size standard for this industry of 1,250 employees or less.²²⁷ U.S. Census Bureau data for 2012 show that 841 establishments operated in this industry in that year.²²⁸ Of that number, 828 establishments operated with fewer than 1,000 employees, 7 establishments operated with between 1,000 and 2,499 employees and 6 establishments operated with 2,500 or more employees.²²⁹ 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

16. The removal of the secondary allocations for non-federal radiolocation and amateur operations currently in the 3.3-3.55 GHz band will not itself impose any new reporting, recordkeeping, or compliance requirements on small entities or other licensees. As mentioned above in Section A, radiolocation operations will be required to move to the 2.9-3.0 GHz band while amateur allocation operations can choose the most appropriate place for their operations to relocate in existing spectrum available amateur operations. The primary compliance obligation created by the *Report and Order* is the requirement that radiolocation and amateur allocation operations relocate from the 3.3-3.5GHz band by a date certain that will be established by the Commission in a future Order. .

17. No comments were filed regarding the specific implications of our proposed relocation requirement, including any associated costs, on small entities. It is possible that the adopted spectrum band relocation requirement may require any affected small entity incumbent licensee to hire attorneys, engineers, consultants, or other professionals. The Commission however is not in a position to quantify the cost of compliance. We note as we did in the IRFA addressing the proposal for the spectrum band relocation requirement, between 3.1-3.3 GHz, the band is allocated for space research (active) and earth exploration satellite (active) in addition to radiolocation services, and there are 17 non-federal radiolocation licenses in the portion of the band below 3.3 GHz, which are held by large power companies and municipalities.²³⁰ Additionally, between 3.3 and 3.55 GHz, there are only eight active licenses being used for a variety of commercial and industrial radiolocation services, with the majority being held by large entities.²³¹ Therefore, the Commission does not expect there to be a significant impact on the reporting, recordkeeping, or compliance requirements for small entities.

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

18. 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

²²⁶ *Id.*

²²⁷ See 13 CFR § 121.201, NAICS Code 334220.

²²⁸ 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>.

²²⁹ *Id.*

²³⁰ Eight licenses are held by Alabama Power Company; seven licenses are held by Georgia Power Company; and two licenses are held by the city and county of Denver/Denver International Airport.

²³¹ Of the eight licenses, three are held by NBC Telemundo License LLC; one is held by Station Venture Operations, LP; one is held by I.O.U. Acquisitions; one is held by Air-Tel, LLC; and one is held by Nexstar Broadcasting, Inc; and one by the Town of Warrensburg/Warrensburg Police Department.

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.”²³²

19. There are a number of steps taken by the Commission that will minimize the economic impact for any small entity that is required to relocated from the 3.3-3.55 GHz band to an alternate spectrum band. First, the date that the Commission will set for radiolocation operators to cease operations in this band will be set to provide them with enough notice to allow them to relocate without causing disruption to their services. Secondary, non-federal radiolocation licensees may continue to operate in this band until a date consistent with the first possible grant of flexible use authorizations to new users in that portion of the band. Next, in relocating these operations to below 3.0 GHz, we believe that this spectrum will allow radiolocation operators to provide the same S band (2-4 GHz) radar services as they do at 3.3-3.55 GHz. By moving their operations below 3.0 GHz, we prevent cross-service interference between radiolocation and future commercial wireless operations in the 3.45 GHz portion of the band, and retain the potential for future flexible use licensing of the 3.1-3.3 GHz band. There is no dispute in the record that existing equipment can be upgraded to support operations in this lower S band spectrum, which should reduce the expense and complexity involved in the relocation.²³³ Furthermore, commenters in the proceeding currently holding these radiolocation licenses agree with this approach, and no comments were filed objecting to this approach or offering any alternative means by which flexible use licensing could move forward in the 3.3-3.55 GHz band. Additionally, the Commission declined to make additional changes to the Table of Allocations such as providing for a co-primary allocation for affected radiolocation operations as proposed by some commenters.²³⁴ Parties proposing such changes failed to sufficiently justify why such changes are necessary to ensure continuity of service for these operations. The Commission concluded that such changes are not necessary and would inappropriately limit other uses of spectrum, and are therefore not in the public interest.

20. In reaching its determination that sunseting the secondary amateur allocation from the entire 3.3-3.5 GHz portion of the band is in the public interest, the Commission considered the objection of commenters who argued the importance of services provided by amateur operators in this band, including both private and emergency communications networks.²³⁵ Despite the utility of amateur operations in this band however, amateur stations are permitted to operate in several different bands and operators that chose to construct networks in this band did so despite the fact that the amateur allocation in the 3.3-3.5 GHz band was secondary and entirely subject to current or future primary operations. Part 97 of the Commission’s rules make clear that amateur operations are a noncommercial, voluntary service. Nevertheless, there are several other nearby bands with propagation characteristics similar to the 3 GHz band available for amateur stations, such as the nearby 2.39-2.45 GHz and 5.65-5.925 GHz bands. The availability of these bands and other comparable bands for amateur use should minimize the impact of relocations for affected entities after the sunset of the secondary amateur allocation.

G. Report to Congress

21. The Commission will send a copy of the *Report and Order*, including this FRFA, in a report to Congress pursuant to the Congressional Review Act.²³⁶ In addition, the Commission will send a

²³² 5 U.S.C. § 604(a)(6).

²³³ NBCUniversal Comments at 5-7 and Nexstar Comments at 7-9.

²³⁴ Nexstar Comments at 9.

²³⁵ As the Commission recognized in the *Notice*, the 3.40-3.41 GHz band is designated for communications to and from amateur satellites. *3.1-3.55 GHz NPRM*, 34 FCC Rcd at 12666, para. 13. However, no amateur satellite uses these frequencies. *See* Radio Amateur Satellite Corporation Comments at 4.

²³⁶ *See* 5 U.S.C. § 801(a)(1)(A).

copy of the *Report and Order*, including this FRFA, to the Chief Counsel for Advocacy of the SBA. A copy of the *Report and Order*, and FRFA (or summaries thereof) will also be published in the Federal Register.²³⁷

²³⁷ See 5 U.S.C. § 604(b).

APPENDIX C**List of Commenters****3.1-3.55 GHz NPRM Comments**

5G Americas
ARRL, the National Association for Amateur Radio
AT&T Services, Inc.
Adam Novak
Albert John Ward III
Amanda Erickson
Amateur Television Network
Amateur Television Network, California Chapter
Amul Gadhia
Amy W. Sorter
Anchorage Amateur Radio Club
The Amateur Radio Emergency Data Network Project
Amateur Television Network – Arizona Chapter
Andrea Slack
Andrew Ludlum
Andrew Lynch
Ann Dorsey
Anthony L. Emanuele
Augusto Sarmiento
Bardwell Area Fire Department, Bardwell, TX
Barney L. Alder III
Barry G. Litherland
Ben McFarlin
Ben Caterinicchio
Benjamin K. Derry
Benjamin Kuo
Bill Buhlman
Bill Poole
Blayne Ence
Bob Koch
Bob Thorpe
The Boeing Company
Bradford S. Ormsby
Bradley K. Leaser
Brandon Fowler
Brandon Kay
Bret Sanders
Brett Popovich
Brian Heinitz
Bruce D. Bonbright
Bruce M. Warren
Bruce Stone
Burton Peake
C Rantala
CTIA
Candace A. Miller
Chad J. Gross

Chad Smith
Charles A. Moorwood
Charles E. Gelm
Charles Kotan
Charles W. Atchison
Charles W. Powell
Charles Zurenko
Chris Mattia
Chris Walsh
Christian Conyers
Christopher Dimond
Christopher LaRue
Christopher Peters
City of Mission Viejo
Clark Highsmith
Clint J. Dague
Collier Chun
CommScope, Inc.
Competitive Carriers Association
Computing Technology Industry Association
Curtis Hays
Dale Clement
Dan Tomlinson
Daniel Fisher
Daniel Krones
Daniel Ruderman
Daniel Sohn, Juliet A. Sohn
Darryl Quinn
Daryl DeVault
Dave Martin
Dave Swickard
David A. Lathrop
David Ahrendts
David Atkins
David Bell
David Buroker
David Dobrin
David E Kitts
David F. McCoy
David Freitag
David Haskell
David J. DeGregorio
David Kight
David Kreizinger
David L. Dupre
David W. Maurer
David West
David Witkowski
Dean Andrewjeski
Dennis A. Yard
Dennis Baker
Devin Ulibarri
Donald W. Price, Jr

Don Russell
Don Melcher
Donald Backstrom
Donald Hill
Doug Leffert
Dwight A. Henderson
Dynamic Spectrum Alliance
Dynerics, Inc.
Eileen O'Connor
Edward F. Finn
Edward L. Johnson
Elias Koppenhaver
Elizabeth Pestolesi
Elizabeth Sweeney
Eric Hobson
Eric Satterlee
Farren Constable
Federated Wireless, Inc.
Francis Parsche
Gary Hinton
Gary Thomas
Gene Harrison
Gerald Handley
Greg W. Bailey
Gregory D. McIntire
Gregory Forrest
Guy S. Chabot
H. Keith Clark
Harry Bergholz, Jr.
Harvey Chin
Heidi Brewer
Henry Wright
Hilary W. McGartlin
Howard B. Patterson, Jr.
J. Allison Hollier
J. Paul Austin Carpenter
Jaci Woods
Jacob M. Bechtold
James Dahl
James Erickson
James Gatwood
James V. Hagan
James Laning
James Moss
James Nelson
James S. Paige
James A. Schuyler
James Strasma
James R. Walls
Jason Baack
Jason Hemphill-Hantub
Jason Peardon
Jeff Beck

Jeff Palmer
Jeff Winklepleck
Jeffrey D. Hendricks
Jeffrey Libby
Jeremiah Bagula
Jeremy Jackson
Jerome R. Chamberlin
Jerome Lamb
Jerry Dunn
Jerry F. Davis
Jesse Kanda
Jim Johnson
Jim Wortham
Joe Ayers
Joe Volpe
Joe W Nichols
Joel Kelley
John Edwards
John Hickey
John Penney
John Schroeder
John Wasciuk
Johnson County Amateur Radio Club
Jonathan Blincoe
Jonathan Katz
Jonathan Wanzer
Jonathan Zimmerman
Jose Melendres
Joseph B. Allee
Joseph W. Partlow
Judy Cox
Justin Atlan
Justin Lentz
Kathi Locker
Keith M. Elliott
Keith S. Gordon
Keith Kasin
Kenneth J. Hendrickson
Kenneth W. Hutchinson
Kenneth Jamrogowicz
Kent Olson
Kevin Bourgault
Kristopher J. Ulmer
Kurt Schanaman
Kyle Tidwell
L. Stephen Bell
Larry Kapp
Larry Levenstone
Larry Loomer
Larry Pignolet
Larry Trullinger
Lenora R. Allee
Leo T. Keefe

Lisa Daniel
Lisa Locker
Lisa Trent
Lockheed Martin Corporation
Loren Kellogg
Louis M. Ruggiero
Martin Woll
Mansfield-Johnson Amateur Radio Service
Mark D. Braunstein
Mark A. Hansen
Mark O. Jensen
Mark Robinson
Martin R. Rothfield
Martin Rumpf
Matt Bonadies
Matt May
Melissa Partida
Michael Calabro
Michael Dudas
Michael Mahan
Michael Newman
Michael Schlenker
Michelle Thompson
Milana Atlan
Mitchell A. Sprowl
Mitchell Mouser
Mooneer Salem
NBCUniversal Media, LLC
Nathan Bailey
Nathan Fernaays
Nicholas Frederick
Nita Sanders
Noah Ratner
Nokia
Olester G. Santos
Oliver Idec
Open Research Institute, Incorporated
Orion Thrower
Orville Beach
Patrick D. Bouldin
Patrick Newburn
Paul James Gerads
Paul G. Tuttle
Paul J. Toth
Paul C. Wade
Peter R. Bergstrom
Peter Kobak
Peter A. Laudenslager
Philip Williams
Piper Networks, Inc.
Radio Amateur Satellite Corporation
Ray David Congdon
Ray Dzek

Ray Luedecke
Reid Crowe
Rich Little
Richard A. Rossback
Richard Bateman
Richard T. Casey
Richard J. Cassato
Richard E. Connor Jr.
Richard F. Daugherty II
Richard Ebbesen
Richard L. Frey
Richard Maier
Robert Andrews
Robert Barkley
Robert Bills
Robert Bowes
Robert C. Lovejoy
Robert Evans
Robert Freeburn
Robert L. Maller
Robert Meade
Robert Moore
Robert W. Pestolesi
Robert S. Shank
Robert Simmons
Rochester VHF Group
Rocky Mountain Ham Radio, Inc.
Roger A Hamilton
Ronald G. Miller
Ronald Jahr
Ronald Jones
Ronald Lundeen
Russell Colomo
Ruth Levenstone
Ryan Garver
Ryan Promack
Ryan Wolfe
San Bernardino Microwave Society
San Francisco Auxiliary Communications Service
Scott Armstrong
Scott Gillins
Scott Underwood
Seaver Klug
Shane Huston
Shelly Smith
Sherri Jackman
Shireesh Verma
Ski Country Amateur Radio Club, Inc.
Stanley Tahara
Stephan F. Andre
Stephen Lewis
Stephen E. Skwarlo
Stephen Stewart

Steve Anness
Steve Luenze
Steve J. Noll
Steven Cummings
Steven M. Hoeger
Steven Lee
Steven Lott Smith
Steven Wooten
Stuart Sheldon
T-Mobile USA, Inc.
Terri B. Skwarlo
The Richardson Wireless Klub
Theodore James Sheffield
Thomas I. Breed
Thomas Mack Dugger
Thomas C. Eagle
Thomas Kocourek
Thomas H. Weyhrauch
Thomas F. Wood
Todd Finnerty
Tom Preston
Tom Wheeler
Tommy Davis
Tracy Ence
Travis J. Williams
Tyler Caldwell
Utah County Sheriff's Communications Auxiliary Team
Wade C. Starks
Vijay Kopparam
Walter Teruya
Wayne Overbeck
Wednesday Warford
William C. Hymes
William Gery
William R. Miller
William Rantala
William Stewart
William Woods
The Wireless Innovation Forum
Wireless Internet Service Providers Association
Zachary Metzinger

3.1-3.55 GHz NPRM Reply Comments

5G Americas
Air-Tel, LLC
Amateur Television Network
CTIA
Dynetics, Inc.
Federated Wireless, Inc.
Nexstar Broadcasting, Inc.
Open Technology Institute at New America
Ross Snyder

Southern Company Services, Inc.
The Wireless Innovation Forum
T-Mobile USA, Inc.

APPENDIX D**Proposed Rules**

The Federal Communications Commission proposes to amend 47 CFR parts 1, 2, and 27 as follows:

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

AUTHORITY: [INSERT CURRENT AUTHORITY CITATION].

22. 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); 3.7 GHz Service (part 27, subpart O); 3.45 GHz Service (part 27, subpart P); 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); 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).

* * * * *

23. Amend section 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 “; and” in its place; and
- c. Adding paragraph (nn).

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

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

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

25. Section 2.106, the Table of Frequency Allocations, is amended as follows:

- a. Revise pages 40 and 41.
- b. In the list of United States (US) Footnotes, add footnotes US103 and USXXX.

The revisions 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 US108 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 US105 U108 US342 3450-3600 FIXED MOBILE except aeronautical mobile	Wireless Communications (27) Citizens Broadband (96)
5.341			US342	US103 US105 US433 USXXX	Page 40

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	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	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)
		5.435	US105 US107 US245 US433		
	3700-4200 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile		3650-3700 FIXED FIXED-SATELLITE (space-to-Earth) NG169 NG185 MOBILE except aeronautical mobile US109 US349	3650-3700 FIXED FIXED-SATELLITE (space-to-Earth) NG169 NG185 MOBILE except aeronautical mobile US109 US349	
			3700-4200	3700-4000 FIXED MOBILE except aeronautical mobile NG182 NG457A	Wireless Communications (27)
				4000-4200 FIXED FIXED-SATELLITE (space-to-Earth) NG457A NG182	Satellite Communications (25)
4200-4400 AERONAUTICAL MOBILE (R) 5.436 AERONAUTICAL RADIONAVIGATION 5.438 5.437 5.439 5.440			4200-4400 AERONAUTICAL RADIONAVIGATION		Aviation (87)
4400-4500 FIXED MOBILE 5.440A			5.440 US261	4400-4500	
4500-4800 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 MOBILE 5.440A			4400-4940 FIXED MOBILE	4500-4800 FIXED-SATELLITE (space-to-Earth) 5.441 US245	
4800-4990 FIXED MOBILE 5.440A 5.441A 5.441B 5.442 Radio astronomy			US113 US245 US342	4800-4940 US113 US342	
5.149 5.339 5.443			4940-4990	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			5.339 US342 US385 G122		
			4990-5000 RADIO ASTRONOMY US74 Space research (passive)		
			US246		

* * * * *

UNITED STATES (US) FOOTNOTES

* * * * *

US103 In the band 3300-3550 MHz, the following provisions shall apply:

(a) 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 new flexible use licenses are issued for operation in the band 3450-3550 MHz. The date by which non-Federal stations in the radiolocation service will be required to cease operations in the band 3300-3550 MHz will be set when the Commission establishes procedures for assigning flexible use licenses. After [insert effective date of the Report and Order], no new assignments may be made to non-Federal stations in the radiolocation service.

(d) 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 3450-3550 MHz. The date by which stations in the amateur service will be required to cease operations in the band 3400-3500 MHz will be set when the Commission establishes procedures for assigning flexible use licenses. Stations in the amateur service may continue to operate in the band 3300-3400 MHz on a secondary basis while the band's future uses are finalized, and 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.

* * * * *

[USXXX PLACEHOLDER]

PART 27 – MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

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

Authority: [INSERT CURRENT AUTHORITY CITATION].

27. Section 27.1 is amended by adding paragraph (b)(16) to read as follows:

§ 27.1 Basis and purpose.

* * * * *

(b) * * *

(16) 3450-3550 MHz.

28. Amend § 27.4 by adding in alphabetical order the definition for “3450-3550 MHz 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(n) (3450-3550 MHz band).

* * * * *

29. Section 27.5 is amended by adding paragraph (n) to read as follows:

§ 27.5 Frequencies.

* * * * *

(n) *3450-3550 MHz band.* The 3.45 GHz Service is licensed as five individual 20 megahertz blocks available for assignment in the contiguous United States on a Partial Economic Area basis, *see*

§ 27.6(n).

30. Section 27.6 is amended 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 (*see* Wireless Telecommunications Bureau Provides Details About Partial Economic Areas, DA 14-759, Public Notice, released June 2, 2014, for more information).

31. Section § 27.11 is amended by adding paragraph (m) to read as follows:

§ 27.11 Initial authorization.

* * * * *

(l) *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(n).

32. Section 27.13 is amended by adding paragraph (n) to read as follows:

§ 27.13 License period.

* * * * *

(n) 3450-3550 MHz Band. Authorization for the band will have a term not to exceed fifteen years from the date of issuance.

33. Section 27.14 is amended by revising the first sentence 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) 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 license 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.

34. Section 27.50 is amended 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 3700-3980 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 (j)(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 and portable stations are limited to 1 Watt EIRP. Mobile and portable stations 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 (j)(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.

35. Section 27.53 is amended by adding paragraph (m) to read as follows:

§ 27.53 Emission limits.

* * * * *

(m) *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 this paragraph (1)(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. 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 beyond the two edges of the band, the conducted power of any emission shall not exceed -25 dBm/MHz within a 20 megahertz offset from the top and bottom edges of the band, and shall not exceed -40 dBm/MHz beyond that 20 megahertz offset.

(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 (1)(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, the minimum resolution bandwidth for the measurement shall be either one percent of the emission bandwidth of the fundamental emission of the transmitter or 350 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.

36. Section 27.55 is amended 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(j), 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.

37. Section 27.57 is amended 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.

38. Section 27.75 is amended to read as follows:

§ 27.75 Basic interoperability requirement.

39. Add new Subpart P to read as follows:

Subpart P – 3450-3550 MHz Band

Sec.

27.1500 3450-3550 MHz band subject to competitive bidding.

27.1501 Designated entities in the 3450-3550 MHz band.

27.1502. Permanent discontinuance of service in the 3450-3550 MHz band.

§ 27.1500 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.

§ 27.1501 Designated entities in the 3450-3550 MHz band.

(a) Definitions.

(1) 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.

(2) 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.

(b) Bidding credits. A winning bidder that qualifies as a small business, as defined in this section, or a consortium of small businesses 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 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.

(c) 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 may use the bidding credit of 15 percent specified in § 1.2110(f)(4) of this chapter.

§ 27.1502 Permanent discontinuance of 3450-3550 MHz licenses.

A 3450-3550 MHz band licensee that permanently discontinues service as defined in § 1.953 must notify the Commission of the discontinuance within 10 days by filing FCC Form 601 requesting license cancellation. An authorization will automatically terminate, without specific Commission action, if service is permanently discontinued as defined in § 1.953, even if a licensee fails to file the required form requesting license cancellation.

APPENDIX E

Initial Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),²³⁸ the Commission has prepared this Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in the *Further Notice of Proposed Rulemaking (Further Notice)*. Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the *Further Notice*. The Commission will send a copy of the *Further Notice*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).²³⁹ In addition, the *Further Notice* and IRFA (or summaries thereof) will be published in the Federal Register.²⁴⁰

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

2. In the *Further Notice*, the Commission proposes to make 100 megahertz of spectrum in the 3.45-3.55 GHz band available for flexible use wireless services throughout the contiguous United States and proposes to add a co-primary, non-federal fixed and mobile (except aeronautical mobile) allocation to the band. The changes we propose in *Further Notice* would not eliminate any federal allocations in the band and federal radiolocation operations will remain co-primary in the 3.45-3.55 GHz band. Incumbent federal operations in the band will have to coordinate with and not cause harmful interference to any new, non-federal fixed or mobile (except aeronautical mobile) operations. Making this band available for non-federal fixed and mobile (except aeronautical mobile) services on a co-primary basis with federal incumbents will enhance the Commission's efforts to provide additional critical mid-band spectrum along with the low-band and high-band spectrum already licensed to support next generation wireless networks.

3. The Commission anticipates that the proposal to add co-primary allocations for 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.²⁴¹

4. To facilitate the proposed reallocation the 3.45-3.55 GHz band, we propose rules, inquire about approaches, and seek comment on a variety of matters including a 3.45-3.55 GHz band plan, future federal incumbent use in the 3.45-3.55 GHz band; relocation of secondary non-federal radiolocation operations; continued operations of amateur stations in the 3.3-3.4 GHz band; technical rules to optimize the potential uses of the band for the next generation of wireless services, while minimizing the impact on adjacent band incumbents consistent with the public interest; licensing and operating rules and regulatory issues; and competitive bidding procedures in the event the Commission adopts procedures that allow the submission of mutually exclusive applications for flexible use licenses in the 3.45-3.55 GHz band and assigns licenses through a system of competitive bidding, as required by the Communications Act.²⁴² By adjudicating these issues, the Commission believes it will create an operational environment that accommodates flexible commercial wireless use and the successful coordination of federal and non-federal operations within the 3.45-3.55 GHz band and coexistence with adjacent bands.

²³⁸ 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).

²³⁹ See 5 U.S.C. § 603(a).

²⁴⁰ See *id.*

²⁴¹ See 47 CFR § 303(y).

²⁴² 47 U.S.C. § 309(j)(1).

B. Legal Basis

5. The proposed action is authorized pursuant to sections 1, 4(i), 157, 301, 303, 307, 308, 309, 310, 316, and 1502 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 154(i), 157, 301, 303, 307, 308, 309, 310, 316, and 1502.

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

6. The RFA directs agencies to provide a description of, and where feasible, an estimate of, the number of small entities that may be affected by the proposed rules, if adopted.²⁴³ The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”²⁴⁴ In addition, the term “small business” has the same meaning as the term “small business concern” under the Small Business Act.²⁴⁵ A small business concern is one that: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.²⁴⁶

7. *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.²⁴⁷ 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.²⁴⁸ These types of small businesses represent 99.9 percent of all businesses in the United States, which translates to 30.7 million businesses.²⁴⁹

8. Next, the type of small entity described as a “small organization” is generally “any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.”²⁵⁰ 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.²⁵¹ Nationwide, for tax year 2018, there

²⁴³ 5 U.S.C. § 603(b)(3).

²⁴⁴ 5 U.S.C. § 601(6).

²⁴⁵ 5 U.S.C. § 601(3) (incorporating by reference the definition of “small business concern” in 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.”

²⁴⁶ 15 U.S.C. § 632.

²⁴⁷ See 5 U.S.C. § 601(3)-(6).

²⁴⁸ 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).

²⁴⁹ *Id.*

²⁵⁰ 5 U.S.C. § 601(4).

²⁵¹ 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.

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.²⁵²

9. Finally, the small entity described as a “small governmental jurisdiction” is defined generally as “governments of cities, counties, towns, townships, villages, school districts, or special districts, with a population of less than fifty thousand.”²⁵³ U.S. Census Bureau data from the 2017 Census of Governments²⁵⁴ indicate that there were 90,075 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States.²⁵⁵ Of this number there were 36,931 general purpose governments (county²⁵⁶, municipal and town or township²⁵⁷) with populations of less than 50,000 and 12,040 special purpose governments - independent school districts²⁵⁸ with enrollment populations of less than 50,000.²⁵⁹ 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.”²⁶⁰

²⁵² 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.

²⁵³ 5 U.S.C. § 601(5).

²⁵⁴ 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>.

²⁵⁵ 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) and special purpose governments (special districts and independent school districts). See also Table 2. CG1700ORG02 Table Notes_Local Governments by Type and State_2017.

²⁵⁶ 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.

²⁵⁷ 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.

²⁵⁸ 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.

²⁵⁹ 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.

²⁶⁰ 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 -

(continued....)

10. *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.²⁶¹ The appropriate size standard under SBA rules is that such a business is small if it has 1,500 or fewer employees.²⁶² For this industry, U.S. Census Bureau data for 2012 show that there were 967 firms that operated for the entire year.²⁶³ Of this total, 955 firms had employment of 999 or fewer employees and 12 had employment of 1000 employees or more.²⁶⁴ Thus under this category and the associated size standard, the Commission estimates that the majority of Wireless Telecommunications Carriers (except Satellite) are small entities.

11. *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.

12. *Fixed Microwave Services*. Microwave services include common carrier,²⁶⁵ private-operational fixed,²⁶⁶ and broadcast auxiliary radio services.²⁶⁷ They also include the Upper Microwave Flexible Use Service²⁶⁸, Millimeter Wave Service²⁶⁹, Local Multipoint Distribution Service (LMDS),²⁷⁰ the Digital Electronic Message Service (DEMS),²⁷¹ and the 24 GHz Service,²⁷² where licensees can

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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.

²⁶¹ 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>.

²⁶² See 13 CFR § 121.201, NAICS Code 517312 (previously 517210).

²⁶³ 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>.

²⁶⁴ *Id.* Available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees. The largest category provided is for firms with “1000 employees or more.”

²⁶⁵ See 47 CFR Part 101, Subparts C and I.

²⁶⁶ See 47 CFR Part 101, Subparts C and H.

²⁶⁷ 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.

²⁶⁸ See 47 CFR Part 30.

²⁶⁹ See 47 CFR Part 101, Subpart Q.

²⁷⁰ See 47 CFR Part 101, Subpart L.

²⁷¹ See 47 CFR Part 101, Subpart G.

²⁷² See *id.*

choose between common carrier and non-common carrier status.²⁷³ 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.²⁷⁴ 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)²⁷⁵ 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.²⁷⁶ For this industry, U.S. Census Bureau data for 2012 show that there were 967 firms that operated for the entire year.²⁷⁷ Of this total, 955 firms had employment of 999 or fewer employees and 12 had employment of 1000 employees or more.²⁷⁸ 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.

13. 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.

14. *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).²⁷⁹ 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.²⁸⁰ The SBA has established a size standard for this industry as all such firms having 750 or fewer employees.²⁸¹ U.S. Census Bureau data for 2012 show that 383 establishments operated in that year.²⁸² Of that number,

²⁷³ See 47 CFR §§ 101.533, 101.1017.

²⁷⁴ These statistics are based on a review of the Universal Licensing System on September 22, 2015.

²⁷⁵ 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>.

²⁷⁶ See 13 CFR § 121.201, NAICS Code 517312 (previously 517210).

²⁷⁷ 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>.

²⁷⁸ *Id.* Available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees. The largest category provided is for firms with "1000 employees or more."

²⁷⁹ 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>.

²⁸⁰ *Id.*

²⁸¹ See 13 CFR § 121.201, NAICS Code 334290.

²⁸² 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,

(continued....)

379 operated with fewer than 500 employees and 4 had 500 to 999 employees.²⁸³ Based on this data, we conclude that the majority of Other Communications Equipment Manufacturers are small.

15. *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.²⁸⁴ 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.²⁸⁵ The SBA has established a small business size standard for this industry of 1,250 employees or less.²⁸⁶ U.S. Census Bureau data for 2012 show that 841 establishments operated in this industry in that year.²⁸⁷ Of that number, 828 establishments operated with fewer than 1,000 employees, 7 establishments operated with between 1,000 and 2,499 employees and 6 establishments operated with 2,500 or more employees.²⁸⁸ Based on this data, we conclude that a majority of manufacturers in this industry are small.

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

16. The Commission expects the rules proposed in the *Further Notice* will impose new and/or additional reporting or recordkeeping and/or other compliance obligations on small entities as well as other applicants and licensees, if adopted. In addition to the proposed rule changes associated with reallocating the spectrum in the 3.45-3.55 GHz band, there will likely be other new compliance obligations. Given the proximity of the 3.45-3.55 GHz band to the 3.7 GHz band, in many instances, the proposals for reporting, recordkeeping and other compliance requirements in the *Further Notice* 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 proposed for small entities and other licensees are described below.

17. *The 3.45-3.55 Band Plan.* We propose to allocate the 3.45-3.55 GHz band as an unpaired band and to license the 3.45-3.55 GHz band on an exclusive, geographic license area on a Partial Economic Area (PEA) basis in 20 megahertz blocks and to not impose any guard bands.

18. *Licensing and Operating Rules.* In the *Further Notice*, we propose that licensees in the 3.45-3.55 MHz band would be required to comply with certain licensing and operating rules applicable to

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<https://data.census.gov/cedsci/table?text=EC1231SG2&n=334290&tid=ECNSIZE2012.EC1231SG2&hidePreview=false&vintage=2012>.

²⁸³ *Id.*

²⁸⁴ 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>.

²⁸⁵ *Id.*

²⁸⁶ See 13 CFR § 121.201, NAICS Code 334220.

²⁸⁷ 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>.

²⁸⁸ *Id.* Available U.S. Census Bureau data does not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees. The largest category provided is for firms with “1000 employees or more.”

all part 27 services,²⁸⁹ including assignment of licenses by competitive bidding,²⁹⁰ flexible use,²⁹¹ regulatory status,²⁹² foreign ownership reporting,²⁹³ compliance with construction notification requirements,²⁹⁴ renewal criteria,²⁹⁵ permanent discontinuance of operations,²⁹⁶ partitioning and disaggregation,²⁹⁷ and spectrum leasing.²⁹⁸ We seek comment on this proposal and on certain other part 27 rules that may be appropriate to apply to 3.45-3.55 GHz band licensees, or whether there are any aspects of our general part 27 service rules that should be modified to accommodate the particular characteristics of the 3.45-3.55 MHz band. In addition, small entities and other future 3.45-3.55 GHz band licensees will 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.

- *Eligibility, License Term and Renewal.* An open eligibility standard has been proposed for licensing in the 3.45-3.55 GHz band along with a 15-year initial term for new flexible use licenses. We also propose to apply our general part 27 renewal requirements for wireless licenses as the renewal standard for the 3.45-3.55 GHz as the Commission did in the 3.7 GHz Service and the 3.5 GHz band orders.
- *Performance Benchmark Requirements.* In the *Further Notice*, we inquire whether the Commission should adopt reporting on performance metrics similar to those adopted in the order for the 3.7 GHz service. We seek comment on which performance requirements should apply to 3.45-3.55 GHz band licensees. Finally, we seek comment on other performance requirements and enforcement mechanisms that would effectively ensure timely buildout.
- *Failure to Meet Performance Requirements.* Along with performance benchmarks, we propose that, in the event a 3.45-3.55 GHz band licensee's authority to operate terminates, its spectrum

²⁸⁹ 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*). We note that the rule the Commission adopted to address construction obligations resulting from partition and disaggregation – 47 CFR § 1.950 – is pending approval from the Office of Management and Budget.

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

²⁹¹ 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).

²⁹² 47 CFR § 27.10.

²⁹³ 47 U.S.C. § 310; 47 CFR § 27.12.

²⁹⁴ 47 CFR § 27.14(k).

²⁹⁵ *Id.* § 1.949. We note that the rule the Commission adopted to address renewal – 47 CFR § 1.949 – is pending approval from the Office of Management and Budget.

²⁹⁶ *Id.* § 1.953. We note that the rule the Commission adopted to address permanent discontinuance of operations – 47 CFR § 1.953 – is pending approval from the Office of Management and Budget.

²⁹⁷ *Id.* § 1.950.

²⁹⁸ *Id.* § 1.9001 *et seq.*

rights should become available for reassignment pursuant to the competitive bidding provisions of section 309(j). We seek comment on whether, consistent with the Commission's rules for other part 27 licenses, we should require that any 3.45-3.55 GHz band flexible use licensee that forfeits its license for failure to meet its performance requirements be precluded from regaining that license.²⁹⁹

- *Compliance Procedures.* In addition to compliance procedures applicable to all part 27 licensees, in the *Further Notice* we propose a rule requiring that such electronic coverage maps 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, we propose that it must provide a map that accurately depicts the boundaries of the area or areas within each license area not being served. We further propose that 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 request 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. This proposal is consistent with the compliance procedures adopted in the *3.7 GHz Service Order*.

19. *Competitive Bidding Procedures.* The *Further Notice* proposes and seeks comment on conducting auctions for licenses of 3.45-3.55 GHz band spectrum 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.³⁰⁰ We also seek comment on whether any of our Part 1 rules or other competitive bidding policies would be inappropriate or should be modified for an auction of licenses in this frequency band. In addition, we propose to make bidding credits for designated entities available for the 3.45-3.55 GHz band and seek comment on this proposal.

20. For small entities, the *Further Notice* seeks comment on whether to make bidding credits available and how to define small businesses. We propose to use the same definitions that the Commission has used in recent years, for other flexible use licenses, where we adopted bidding credits for the two larger designated entity business sizes provided in the Commission's part 1 standardized schedule of bidding credits. Specifically, we propose a requirement for an entity to have average gross revenues for the preceding five years not exceeding \$55 million to be a small business, and such an entity would be eligible for a bidding credit of 15%. To be classified as a very small business an entity would be required to have average gross revenues for the preceding five years not exceeding \$20 million and would be eligible for a bidding credit of 25%.³⁰¹ We also propose to offer a rural service bidding credit.

²⁹⁹ 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.

³⁰⁰ *See* 47 CFR §§ 1.2101-1.2114.

³⁰¹ 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.

21. *Technical Rules.* Small entities and other licensees would also be subject to certain technical rules established to maximize flexible use of the 3.45-3.55 GHz band spectrum while minimizing the impact on adjacent band incumbents, consistent with the public interest. In that context, we propose to align 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 propose and seek comment on technical rules regarding power limits, out-of-band emissions limits, antenna height limits, service area boundary limits, international coordination requirements, and any other technical rules that will maximize flexible use of the band while protecting new, non-federal licensees and federal incumbents in adjacent bands.

22. To comply with the proposed rules in the *Further Notice*, 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 necessary to make the requisite filings and to demonstrate compliance with the proposed performance obligations. At this time, while the Commission cannot quantify the cost of compliance with the proposed rule changes, we note that several of the proposed changes are consistent with and mirror existing policies and requirements used for 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 if similar requirements are adopted for 3.45-3.55 GHz band spectrum. We also note that for most of the proposals and requests for comments in the *Further Notice*, the Commission also requests cost and benefit analysis. The Commission expects that the information it receives in comments will help it identify and evaluate all relevant matters associated with the proposed reallocation and the relocation of public safety operations out of the band, including compliance costs and other burdens on small entities.

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

23. The RFA requires an agency to describe any significant, specifically small business, alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): “(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and 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.”³⁰²

24. The Commission has taken steps to enable it to minimize the economic burden on small entities that could occur if some of the proposed rule changes and approaches upon which we seek comment upon in the *Further Notice* are adopted. More specifically, in many of the proposals for 3.45-3.55 GHz band spectrum, we propose applying existing requirements applicable in other spectrum bands. Given the 3.45-3.55 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 propose or seek comment on applying the rules recently adopted for that band in order to facilitate efficiencies and synergies with the 3.7 GHz band. This could lessen the compliance costs for small entities who 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 its operations for 3.45-3.55 GHz band spectrum compliance should our proposals be adopted. Below we describe areas where we have taken such an approach.

- *Allocation.* In considering how to reallocate the spectrum, we seek to provide flexibility for new 3.45-3.55 GHz band licensees to tailor the use of the band to their specific operational needs and

³⁰² 5 U.S.C. § 603(c)(1)-(4).

to maximize network efficiency.³⁰³

- *Spectrum Block Size.* Given the 3.45-3.55 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 propose to adopt 20 megahertz blocks for this band in order to facilitate efficiencies and synergies with the 3.7 GHz band.
- *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 propose to allocate the 3.45-3.55 GHz band as an unpaired band.
- *Geographic License Area Size.* Consistent with our approach in several other bands used to provide fixed and mobile services, we propose to license the 3.45-3.55 GHz band on an exclusive, geographic area basis.
- *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 proposal 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.
- *Performance Requirements, Performance Requirement Failure Penalties and Compliance Procedures.* The requirements and procedures proposed or on which we seek comment in the *Further Notice* are based on or would apply existing part 27 requirements.
- *Technical Rules.* Many of the technical rules proposed in the *Further Notice* are based on the rules adopted for the 3.7 GHz band or for other mid-band spectrum, which bands are similar to the 3.45-3.55 GHz band.
- *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 our analysis of past auction data, the relative costs of participation are lowered for small businesses that take full advantage of the bidding credit programs. Thus, as mentioned in the prior section, we have proposed to conduct an auction for licenses for spectrum in the 3.45-3.55 GHz band in conformity with the general competitive bidding rules set forth in Part 1, Subpart Q, of the Commission's rules and to use competitive bidding procedures used by the Commission in previous auctions.³⁰⁴ We have also proposed to apply the definition of a qualifying "small business" and a "very small business"³⁰⁵ and apply the bidding credits for these two categories, and for rural service providers, consistent with past auctions.

³⁰³ See 47 CFR § 2.106.

³⁰⁴ See 47 CFR §§ 1.2101-1.2114.

³⁰⁵ 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.

25. In the *Further Notice*, the Commission specifically seeks comment on its proposals and the questions it raises which can help to identify whether small entities face any special or unique issues with respect to the buildout and other requirements that would require certain accommodations or additional time to comply. The Commission also seeks comment on modifications that could be made to our rules regarding administrative processes in order to reduce the economic impacts of the proposed rule changes on small entities. By specifically targeting small entities the Commission hopes to obtain the requisite data to allow it to evaluate the most cost-effective approach to minimize the economic impact for such entities, while achieving its statutory objectives.

26. Additionally, to assist with the Commission's evaluation of the economic impact on small entities that may result from the actions and alternatives that have been proposed in this proceeding, the *Further Notice* seeks alternative proposals and requests information on the potential costs of such alternatives to licensees. The Commission expects to consider more fully the economic impact on small entities following its review of comments filed in response to the *Further Notice*, including costs and benefits information. Alternative proposals and approaches from commenters could help the Commission further minimize the economic impact on small entities. The Commission's evaluation of the comments filed in this proceeding will shape the final conclusions it reaches, the final alternatives it considers, and the actions it ultimately takes in this proceeding to minimize any significant economic impact that may occur on small entities from the final rules that are ultimately adopted.

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

27. None.