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**FEDERAL COMMUNICATIONS COMMISSION**

**47 CFR Parts 1 and 30**

**[WT Docket No. 24-243, GN Docket No. 14-177; FCC 25-24; FR ID 293183]**

# Lower 37 GHz Band and Use of Spectrum Bands Above 24 GHz for Mobile Radio Service

**AGENCY:** Federal Communications Commission.

**ACTION:** Final rule.

**SUMMARY:** In this document, the Federal Communications Commission (Commission) makes available 600 megahertz of high-frequency spectrum for flexible fixed and mobile use by establishing a mechanism for access to the 37–37.6 GHz band (Lower 37 GHz band). This spectrum, which is shared between non-Federal and Federal operators, can be used for fixed wireless broadband, Internet of Things (IoT), or other innovative services. Crafted in collaboration with the National Telecommunications and Information Administration (NTIA) and with input from the Department of Defense (DoD), this new regime provides access to a block of millimeter wave spectrum with low barriers to entry.

**DATES:** Effective [**INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***], except for amendatory instructions 11 (adding § 30.501) and 12 (adding § 30.503), which are delayed indefinitely. The Commission will publish a document in the *Federal Register* announcing the effective date.

**FOR FURTHER INFORMATION CONTACT:** Catherine Schroeder, Wireless Telecommunications Bureau, Broadband Division, at Catherine.Schroeder@fcc.gov or (202) 418-1956.

**SUPPLEMENTARY INFORMATION:** This is a summary of the Commission's *Report and Order and Sixth Report and Order* in WT Docket No. 24-243 and GN Docket No. 14-177; FCC 25-24, adopted on April 28, 2025, and released on April 29, 2025. A *Further Notice of Proposed Rulemaking (FNPRM)* relating to the *Report and Order and Sixth Report and Order* will be published in the Proposed Rule section of the *Federal Register* on the same date as this summary. The full text of the document is available at https://www.fcc.gov/document/fcc-clears-way-wireless-innovation-lower-37-ghz-band-0.

**Final Regulatory Flexibility Analysis**

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, the Commission has prepared a Final Regulatory Flexibility Analysis (FRFA) concerning the possible impact of the rule changes contained in the *Report and Order* on small entities. The FRFA is set forth section IV.

**Paperwork Reduction Act**

The *Report and Order and Sixth Report and Order* contains new information collection requirements subject to the Paperwork Reduction Act of 1995 (PRA), Public Law 104-13. It will be submitted to the Office of Management and Budget (OMB) for review under section 3507(d) of the PRA. OMB, the general public, and other Federal agencies will be invited to comment on the new or modified information collection

requirements contained in this proceeding. In addition, the Commission note that pursuant to the Small Business Paperwork Relief Act of 2002, Public Law 107-198, see 44 U.S.C. 3506(c)(4), the Commission previously sought specific comment on how the Commission might further reduce the information collection burden for small business concerns with fewer than 25 employees.

In this present document, the Commission has assessed the effects of requiring entities interested in operating in the Lower 37 GHz band to submit applications for nationwide, non-exclusive licenses and to coordinate their proposed operations with other operators. It finds that such requirements are necessary to comply with statutory requirements and to avoid interference. The proposed information collection requirements would apply equally to small and large entities.

**Congressional Review Act**

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

## I. INTRODUCTION

1. This item builds on the Commission's longstanding work to enable greater and more intensive use of spectrum. Specifically, it establishes a framework to share the Lower 37 GHz band among Federal and non-Federal users. This framework will allow the Lower 37 GHz band to be used for a range of services through rules designed to accommodate a variety of use cases—including backhaul and backbone links; fixed wireless broadband systems; Internet of IoT-type systems; and supplemental capacity

for mobile systems. The Commission also adopts an initial mechanism for coordinating co-primary shared Federal and non-Federal uses of the band, developed jointly with NTIA with input from DoD and other interested Federal and non-Federal stakeholders.

2. The *Report and Order and Sixth Report and Order* is the next step in the Commission's efforts to make millimeter wave (mmW) spectrum available for intensive use, and to ensure continued American leadership in wireless services. Such leadership is critical for economic growth, job creation, public safety, and global competitiveness. The framework the Commission sets for the Lower 37 GHz band will allow for co-primary spectrum sharing between Federal and non-Federal users in the same spectrum band by offering site-based authorizations capable of accommodating systems that do not require geographic area licenses. By developing a framework that makes 600 megahertz of additional millimeter wave spectrum available for commercial and for government use, the Commission takes another critical step towards providing opportunities for more robust spectrum-based services that serve the nation's interests.

## II. BACKGROUND

3. *Lower 37 GHz Allocations.* The entire 37 GHz band (37–38.6 GHz) is allocated to the fixed and mobile services on a primary basis for Federal and non-Federal use. Portions of the 37 GHz band are also allocated to the Space Research Service (SRS) (space-to-Earth) on a primary basis for Federal use (37–38 GHz), and to the Fixed-Satellite Service (FSS) (space-to-Earth) on a primary basis for non-Federal use (37.5–38.6 GHz). The use of this FSS downlink allocation is limited to individually-licensed earth stations, and is also subject to other limitations. In addition, the 37 GHz band is adjacent to the 36–37 GHz band, where passive sensors in the Earth Exploration Satellite Service (EESS) and SRS are located.

4. In 2016, the Commission adopted rules to permit fixed and mobile terrestrial operation in the 37 GHz band (*2016 Order*, 81 FR 79894). The Commission adopted a licensing regime for the 37.6–38.6 GHz portion of the band (Upper 37 GHz band), and made the Lower 37 GHz band available for coordinated co-primary sharing between Federal and non-Federal users, in which users have a right to interference protection, but no right to exclude other users. It explained that Federal and non-Federal users would access the Lower 37 GHz band through a coordination mechanism, which would be developed more fully through an accompanying FNPRM and Federal agency/industry collaboration. The Commission adopted the same technical rules for the Lower 37 GHz band and the Upper 37 GHz band.

5. In the accompanying *2016 FNPRM* (81 FR 58270), the Commission sought comment on a proposal under which Federal and non-Federal fixed and mobile users would access the Lower 37 GHz band by registering individual sites through a coordination mechanism. Under the proposal, the coordination mechanism would facilitate coordinated access by authorizing a particular user to use a particular bandwidth of spectrum at a particular location. The Commission sought comment on the coordination mechanism and the functions that it should be able to perform.[1] The Commission also sought comment on other aspects of the Lower 37 GHz band regime, including whether a portion of the lower band segment should be made available for priority access by Federal users; whether an enforcement mechanism in the Lower 37 GHz band is necessary to help identify and rectify interference events; and whether and how to apply secondary market rules to the Lower 37 GHz band.

[1] As proposed, the coordination mechanism would: (1) be able to obtain information about the type of equipment used, the signal contour from the coordinated location, and the bandwidth requested compared with the bandwidth available; (2) be capable of regularly updating the status of a coordinated location (on/off or authorized/unauthorized); and (3) be able to incorporate this type of information for both Federal and non-Federal fixed and mobile uses.

6. In 2018, the Commission denied petitions for reconsideration asking that it adopt exclusive area licensing in the Lower 37 GHz band, and that it not allow Federal entities to have expansion rights in that band (83 FR 34478, corrected 84 FR 17360). Instead, the Commission affirmed its prior conclusion that "[a]llowing part of the band to be made available on a non-exclusive, shared basis will promote access to spectrum by a wide variety of entities, support innovative uses of the band, and help ensure that spectrum is widely utilized." In an accompanying FNPRM, the Commission also sought comment on how to coordinate operations under a non-exclusive licensing regime that could be used to share spectrum either between non-Federal entities or between Federal and non-Federal entities (*2018 FNPRM*, 83 FR 34520). The Commission sought comment on a first-come-first-served licensing or registration scheme. It further sought comment on three types of non-Federal licenses for the Lower 37 GHz band: point-to-point licenses; base station licenses; and "site-cluster licenses," in which the applicant would license a larger non-exclusive point-radius license within which it could register individual base stations and/or point-to-point links. It also sought comment on using the notice and response rules applicable to part 101 microwave operations to coordinate operations, as well as a proposal by Starry, Inc. to require use of a third-party coordinator. The Commission also asked commenters to address how to prevent "warehousing," whereby a licensee preserves its spectrum usage rights without providing actual service.

7. In the *2018 FNPRM*, the Commission also recognized the importance of the Lower 37 GHz band to future Federal operations, and stated its intent to work in partnership with NTIA, DoD, and other Federal agencies to develop a sharing approach that allows for robust Federal and non-Federal use in the Lower 37 GHz band. The Commission proposed to require non-Federal users to work with Federal users in good faith to coordinate any new system Federal users might seek to deploy. At the same

time, it anticipated that non-Federal users would not be required to agree to coordination requests that would carry a significant risk of harmful interference, and it sought comment on the best means of coordinating with Federal operations. To the extent that the solution to preserving a Federal entity's options may be to reserve a part of the band for its priority use, the Commission asked how to define such priority rights.

8. The Commission received fifteen comments and eight reply comments to the *2018 FNPRM* that addressed the Lower 37 GHz band. Commenters express a variety of views on licensing the band. Some commenters continued to urge the Commission to adopt geographic area licensing despite the Commission's prior decisions not to use geographic area licensing in the Lower 37 GHz band. Other commenters offered general principles the Commission should use but do not discuss specific licensing mechanisms. Several commenters suggested the Commission base its rules on those adopted for the 71–76 GHz and 81–86 GHz bands (70/80 GHz bands). Other commenters proposed that indoor use be authorized on a licensed-by-rule basis. Additionally, in 2023, some interested parties provided comments on sharing in the Lower 37 GHz band in response to the Commission's *42 GHz NPRM* (88 FR 49423).

9. Subsequently, in 2023, the National Spectrum Strategy (NSS), adopted under the prior Administration, identified the Lower 37 GHz band for further study "to implement a co-equal, shared-use framework allowing Federal and non-Federal users to deploy operations in the band."

10. To aid in the study of the band, the Commission's Wireless Telecommunications Bureau (WTB) issued a Public Notice seeking further development of the record relating to the Lower 37 GHz band (*2024 Public Notice*; 89 FR 68610). The *2024 Public Notice* specifically solicited further information on: (i) potential uses of

the Lower 37 GHz band; (ii) a two-phase coordination framework; (iii) adjacent band protections, including whether additional measures are needed to protect spaceborne remote passive sensors in the 36–37 GHz band; (iv) a licensing process, which would involve two steps for non-Federal operations; and (v) priority access for DoD and military agency departments in the 37–37.2 GHz portion of the band. It also sought general input on a means of ensuring widespread access to Lower 37 GHz spectrum. The Commission received thirteen comments and four *ex parte* filings in response to the *2024 Public Notice*.

11. On November 29, 2024, DoD and NTIA released a report recommending adoption of the coordination framework described in the *2024 Public Notice*; establishing priority access for DoD in the 37–37.2 GHz portion of the band while retaining co-equal access for Federal and non-Federal users in the 37.2–37.6 GHz portion of the band; and establishing stricter out-of-band emission limits than the Commission previously adopted in 2016 in order to protect adjacent band operations in the 36–37 GHz band

## III. REPORT AND ORDER AND SIXTH REPORT AND ORDER

12. As previously decided, the Lower 37 GHz band will be made available for Federal and non-Federal use on a co-primary, shared basis. Under this sharing framework licensees with operations have a right to interference protection, but no right to exclude other users. In the *Report and Order*, the Commission adopts a licensing framework that requires non-Federal users first to obtain a nationwide non-exclusive license. Next, users would coordinate their proposed site-based operations with other potentially affected operators using a two-phase interference coordination process. Following successful coordination, licensees would register their proposed sites pursuant to procedures to be established by WTB. The Commission also adopts

interference protection criteria to govern the coordination process and facilitate sharing between and among Federal and non-Federal users.

13. In addition, the Commission adopts rules that grant a priority to military systems operating in the 37–37.2 GHz portion of the band. The Commission also sets forth construction requirements for non-Federal users in the band and adopt more stringent requirements during the initial site registration round to ensure efficient and effective spectrum use and prevent spectrum warehousing. Finally, the Commission declines to adopt secondary market rules given the licensing framework it adopts herein.

### A. Licensing Framework

14. The Commission adopts a two-step non-Federal licensing framework under which a non-Federal entity seeking to operate in the Lower 37 GHz band first obtains a nationwide non-exclusive license covering all the frequencies in the Lower 37 GHz band, and then applies for site-based registrations. Nationwide non-exclusive licenses best serve the public interest based on this band's specific characteristics (including propagation), and the characteristics of the contemplated technologies and use cases.[2] The Commission also notes that, given the characteristics of the Lower 37 GHz band and services, a nationwide, non-exclusive approach will serve the public interest by permitting a range of users to obtain a license and explore the opportunities the band provides. The straightforward approach offers would-be entrants operational flexibility by requiring them to provide site-specific information only after sites are

[2] The Commission notes that it also has proposed and adopted similar nationwide non-exclusive licensing regimes in other spectrum bands based on the factors presented in those proceedings. *See, e.g.*, *Allocations and Service Rules for the 71–76 GHz, 81–86 GHz and 92–95 GHz Bands et al.*, WT Docket No. 02-146, RM-10288, Report and Order, 18 FCC Rcd 23318 (2003) (69 FR 3257); *Allocation of Spectrum for Non-Federal Space Launch Operations et al.*, ET Docket No. 13-115, RM-11341, Second Report and Order and Second Further Notice of Proposed Rulemaking, 38 FCC Rcd 9029, 9053–58 paras. 66–77 (2023) (89 FR 63296 and 88 FR 6488); *Wireless Operations in the 3650-3700 MHz Band et al.*, ET Docket No. 04-151 *et al.*, Report and Order and Memorandum Opinion and Order, 20 FCC Rcd 6502, 6512–13 paras. 25–27 (2005) (70 FR 24712).

successfully coordinated and registered. There is no limit on the number of non-exclusive nationwide licenses that may be granted for Lower 37 GHz, as these licenses serve only as a prerequisite for coordinating and registering individual point-to-point links and base stations.

15. The Commission declines to reconsider adoption of a geographic area licensing regime, as some commenters have recommended. The Commission previously rejected the use of geographic area licensing in the Lower 37 GHz band, and revisiting the Commission's framework for sharing the 37 GHz band would delay the ability to bring this spectrum to market expeditiously.

16. The Commission also rejects the "Property Zone" license area concept proposed by Intel and Cisco, because the Commission finds that adopting a special category of license is unnecessary. As proposed by Intel and Cisco, a Property Zone license would be a form of geographic area license issued to a property owner and defined by the boundary of the real property in question. As Intel and Cisco state, "under the rules already adopted, a real property owner would be able to register and operate a site defined by its property boundary even if the [Property Zone] license category did not exist." The Commission agrees. The Commission disagrees with Intel and Cisco, however, that the creation of Property Zone licenses "has advantages in the operational efficiency of the sharing framework." On the contrary, the Commission finds that the simplified licensing framework the Commission adopts allow property owners to register their operations using the same straightforward framework as every other non-Federal licensee in the Lower 37 GHz band.

### B. Coordination Process

17. *Background.* In the *2016 FNPRM*, the Commission sought comment on the most appropriate coordination mechanism for the Lower 37 GHz band. In 2018, the

Commission noted that the Lower 37 GHz band would accommodate a variety of use cases and sought comment on utilizing a third-party coordinator or, alternatively, implementing a coordination model similar to that used in part 101 point-to-point bands.

18. Commenters on the *2016 FNPRM* and *2018 FNPRM* largely do not discuss or propose any coordination mechanisms or specific parameters. Several commenters suggest the Commission base its rules on those adopted for the 71–76 GHz and 81–86 GHz bands (70/80 GHz band). Other commenters propose that indoor use be authorized on a licensed-by-rule basis.

19. In 2020 the Commission began collaborating with NTIA and DoD to further define and develop a possible coordination mechanism that would permit the innovative type of Federal/non-Federal spectrum sharing envisioned for the Lower 37 GHz band. These conversations focused on balancing the desire to make this spectrum available expeditiously for deployment with the need to protect both Federal and non-Federal operations in the band from harmful interference. In the *2024 Public Notice*, WTB described this potential coordination mechanism, including the technical details of its interference analysis. This two-phase framework was developed to ensure meaningful access to spectrum by later entrants, including Federal entrants, while also ensuring adequate protection from harmful interference for the operations of incumbents and earlier applicants, and the ability to register and deploy sites quickly and efficiently.

20. The Commission received a range of comments discussing this coordination mechanism. One group of commenters supports the Phase One/Phase Two approach described in the *2024 Public Notice*, while another group favors the use of a dynamic spectrum management system (DSMS). Some commenters suggest that the coordination mechanism would benefit from further development, specifically by or in conjunction with commercial entities. Multiple commenters suggest specific

requirements for Phase Two coordination with Federal entities, including a shot clock or specific requirements on information disclosure.

21. *Discussion.* The Commission adopts a two-phase coordination framework, as described in the *2024 Public Notice.* This framework will allow coordination to proceed efficiently while maintaining interference protection for previously registered sites.

22. In the first phase of coordination, licensees will use certain technical parameters of their proposed site registration to generate an interference contour for the proposed site.[3] For a point-to-point link, the parameters will include transmitter location (latitude and longitude), equivalent isotropic radiated power (EIRP), transmitter antenna height, receiver antenna height, and antenna azimuth angle. A point-to-multipoint or base-to-mobile site will also require submitting these parameters except for receiver antenna height and antenna azimuth angle. The applicant will use the required parameters, together with a propagation model that takes into account propagation loss due to terrain, to generate an interference contour for the proposed site. It will then compare its contour with the contours of non-Federal sites that previously have been registered in the database designated by WTB and Federal sites that have previously been authorized by NTIA. If this interference contour does not overlap with the contour for any previously registered site, then coordination is successful, and the licensee may proceed to register its proposed site, pursuant to procedures to be established by WTB. Further, the Commission anticipates that third party coordinators might offer services to licensees that draw these contours and compare for overlap with incumbent operator areas. Nonetheless, the Commission recognizes that the development of a portal that

[3] As noted in the DoD/NTIA Report: "NTIA will implement the database for coordination between Federal and non-Federal systems, as it does now for the 70/80/90 GHz coordination portal." Additional implementation details about this process will be provided.

would automate the creation and comparison of Phase One contours could be useful to licensees, and the Commission directs FCC staff to collaborate with NTIA staff on the development of such a portal.

23. If the first phase of coordination indicates an overlap between the interference contours of the proposed site and a previously registered site or authorized non-Federal site, then coordination is not yet successful, and will proceed instead to Phase Two coordination. In this phase, the licensee of the proposed site will directly contact the operator(s) of the existing site(s). Non-Federal operators' contact information will available to the public pursuant to procedures to be established by WTB; Federal operators' contact information will be provided by NTIA. The licensee of the proposed site will provide additional technical details of the site to the other operators. Under the rules the Commission adopts herein, non-Federal operators will have fifteen business days to respond with the technical details of their existing sites. The subsequent Phase Two coordination discussions would then explore whether and under what circumstances a placement inside the relevant interference contours might be feasible, such as with the use of more advanced interference mitigation techniques including antenna directivity, polarization, or shielding. Operators, including Federal operators and the licensee of the prospective site, will negotiate and cooperate in good faith to determine whether coexistence would be possible. The Commission anticipates that operators will work expeditiously to identify solutions for co-existence. If the operators reach an agreement, then coordination is successful and the licensee may register the prospective site pursuant to procedures to be established by WTB.

24. Though the Commission does not find it necessary at this time to mandate the use of a third-party coordinator or database administrator, as requested by Comsearch and NCTA, it does emphasize that, under the coordination mechanism adopted herein, applicants have the flexibility to use a third-party coordinator for any of

the Phase One and Phase Two functions. Ultimately, in order to preserve interference protection for site-specific locations, licensees must ensure that these locations are registered pursuant to procedures to be established by WTB.

25. A dispute resolution process will be established to resolve disputes that arise during the coordination process. In the case of a dispute between non-Federal entities, this process will be overseen by the Commission; disputes between non-Federal and Federal entities will be overseen jointly by the Commission and NTIA.[4]

26. The Commission directs WTB to work with NTIA and relevant Federal agencies to work out the details of how the coordination process, including the dispute resolution process, will be implemented, consistent with the rules and principles adopted herein. The Commission also direct WTB to provide licensees with appropriate notifications and instructions concerning the coordination process.

27. The Commission acknowledge the suggestions of some commenters that a DSMS could provide a more efficient solution for spectrum sharing in this band. However, at this time the record does not support one specific DSMS model nor identify the parameters that would be required to implement a DSMS. In the interest of moving expeditiously toward deployment in this band, the Commission adopt the Phase One/Phase Two framework for which the Commission have established technical parameters and which the Commission are confident will be sufficient to protect Federal and non-Federal operations. In addition, as some commenters note, adoption of this approach does not necessarily foreclose the later adoption of a DSMS. By registering a site, licensees are not granted a right to exclude others from their registration area but

[4] DoD and NTIA explain that they expect that Federal or non-Federal entities operating or seeking to operate in the Lower 37 GHz band "may request that NTIA and FCC establish a process to resolve the dispute" and propose that "NTIA and the FCC will initiate the dispute resolution process within 30 days" after receiving a written request for assistance and the requested technical data.

are protected against actual interference by later-registered sites. Therefore, a DSMS would potentially be compatible with existing deployments and registrations in the band, and the Commission seeks comment elsewhere on whether to pursue this approach in the future.

28. *Additional Coordination Requirement for Operations in 37.5–37.6 GHz.* The 37.5–37.6 GHz sub-band is shared with the Fixed-Satellite Service. Licensees seeking to operate in the 37.5–37.6 GHz portion of the band must therefore also obtain the consent of licensees of co-channel Fixed-Satellite Service earth stations before registering site-specific locations located within the protection zone established under § 25.136(b) and (c) of the Commission's rules.[5]

29. *Indoor-Only GAA Operations.* The Commission declines to allow indoor-only operations on an uncoordinated or General Authorized Access (GAA) basis, as proposed by the Digital Services Act (DSA) and New America/Open Technology Institute (OTI). While certain building materials effectively block millimeter wave signals, that is not true for certain types of glass or other materials. Given the wide variety of operations that may co-exist in the Lower 37 GHz band, the Commission believe that it is prudent for all proposed operations to coordinate and register their operations.

### C. Interference Protection Criteria

30. As noted above, in the *2016 Order* the Commission adopted the same technical rules for the Lower 37 GHz band and the Upper 37 GHz band. Currently, the Commission's rules apply the same field strength limits throughout the 28 GHz, 37 GHz,

[5] To avoid confusion, the Commission provides an explanation of how this will work in practice: New terrestrial operations will have to avoid any existing exclusion zone established around an already licensed earth station or coordinate with the earth station operator to be within the zone. Applicants for new earth stations will be required to coordinate with already existing terrestrial operations within the zone pursuant to 47 CFR 25.136. If a new earth station is licensed, then future terrestrial operations will be precluded from the exclusion zone absent successful coordination with the earth station.

and 39 GHz bands, including in the Lower 37 GHz band. Licensees may not exceed a power flux density (PFD) level of -76 dBm/$m^2$/MHz at the geographical border of their license area, unless the adjacent affected service area licensee agrees to a different PFD.

31. The site registration scheme the Commission adopts herein defines registered sites by calculation from the specifics of the site's transmitter and the surrounding terrain, rather than using a defined geographic area or radius. Accordingly, the field strength limit in § 30.204 will be inapplicable to sites in the Lower 37 GHz band, and the Commission amends that rule to exclude the Lower 37 GHz band.

32. Instead of a market boundary limit, the coordination mechanism the Commission adopt for this band requires a coordination trigger: the field strength level at which the interference contour is set. Appendix A to the *2024 Public Notice* specified the coordination trigger as a power spectral density threshold (PSDT) of -110 dBm/100 MHz. Ericsson supports this coordination trigger, while NCTA opposes it as too conservative, especially given that the proposed propagation model does not incorporate clutter or the highly focused nature of the transmission beams in this band. While this is a more conservative threshold than the market boundary limit discussed above, it is appropriate here given its different function; deployments within this contour are not precluded, but instead require further coordination. Accordingly, the Commission adopts a coordination trigger of a power spectral density threshold (PSDT) of -110 dBm/100 MHz for the purposes of the Phase One coordination mechanism in this band.

33. Regarding clutter, the Commission notes that it can make a significant difference in interference potential and can make propagation modeling substantially more accurate and allow for more intensive use of the band. At this time, the

Commission does not have a sufficient record to incorporate clutter into the Phase One calculations. The Commission separately seeks to develop a record that would allow it to incorporate clutter into the Phase One calculations.

34. Some commenters have raised the issue of adjacent channel interference between Upper 37 GHz and Lower 37 GHz licensees in the top 100 MHz channel of the Lower 37 GHz band (37.5–37.6 GHz). This concern is addressed by the out-of-band emission limits already present in the Commission's rules, which apply to licensees in all Upper Microwave Flexible Use Service (UMFUS) bands, including the Lower 37 GHz band. The interference potential between stations in the Lower 37 GHz band and adjacent channel stations in the Upper 37 GHz band is no greater than the existing interference potential between adjacent channel stations within the Upper 37 GHz band. Because the Commission's part 30 rules already address this issue, the Commission do not adopt any further limits or restrictions for the Lower 37 GHz band specifically.

### D. Site Registration

35. An operator seeking to register sites for non-Federal operations must first obtain a non-exclusive nationwide license, and then successfully coordinate each proposed site with all relevant Federal and non-Federal incumbent operators. After completing those steps, a licensee must register individual site locations. Verizon, Ericsson, and NCTA support the site registration requirement. Registration should provide all required technical information on the proposed operations and sufficient evidence of successful coordination, such as a "green light" result from a third-party coordinator. The specific requirements for registration applications, and the dates of the initial registration filing window, will be announced by WTB in a future public notice.

36. The Commission proposed to allow point-to-point and point-radius site registrations. The Commission adopt this proposal in a modified form. Point-to-point

and point-to-multipoint site registrations will both be accepted; however, point-to-multipoint sites will not be associated with a specified radius, which in the Commission's previous proposal functioned as a type of exclusion zone. Instead, all sites will have an associated interference contour that will be used in the coordination process but not separately represented in the database of record, although it may be calculated based on the parameters available in a site's entry in the database. Point-to-multipoint user stations at fixed locations, deployed in conjunction with a registered base station site and transmitting at or under the +75 dBm/100 MHz EIRP limit applicable to fixed stations, need not be individually coordinated, but may operate under the coordination of the base station(s) they are communicating with.

37. The Commission declines to adopt its proposal to implement site-cluster licenses. Without any support in the record for this proposal, the Commission finds that site-cluster licenses are not necessary to promote the efficient deployment of the Lower 37 GHz band. Licensees may still deploy networks by individually registering multiple sites to create a network.

38. *Initial Site Registration Round*. Following the application window for nationwide licenses, WTB will open an initial window for site registrations ("initial site registration round"). Because there will be no non-Federal UMFUS operations in the band when this initial window is opened, licensees will not be required to coordinate with other UMFUS licensees prior to filing registrations during this initial site registration round only, though they will need to coordinate with Federal operators through procedures to be developed by NTIA and the Commission and subsequently announced. Site registrations will be processed in order of receipt unless a later-filed registrant provides evidence that it completed coordination prior to the other registrant. Using a first-in-time approach will simplify processing of registrations and help eliminate the possibility of mutually exclusive registrations. Priority will be awarded to site

registrations on a first-in-time basis, according to the timestamp on the complete, accepted site registration application. Later-filed applications that conflict with priority registrations will be dismissed without prejudice and may be refiled after coordinating with existing registrants. After registrations in the initial site registration round are processed, registrations will be accepted on an ongoing basis, subject to compliance with the coordination rules.

39. *Additional Steps towards Implementation of the Licensing Framework.* As noted in various sections above, there are a number of actions that will be taken before the initial registration round will begin. WTB will develop procedures for filing applications for nationwide non-exclusive licenses and will announce these procedures in a Public Notice that establishes the application filing window. WTB also will determine the appropriate procedures for registering non-Federal sites, taking into account determinations that NTIA will make about how information about Federal sites will be made available to Commission licensees, and systems work will be done to make information available. WTB and NTIA will work together to develop additional coordination procedures, including a dispute resolution process, after required or appropriate notice and comment, consistent with the rules and principles adopted herein. Guidance regarding the coordination process and registration procedures will be announced by WTB in a Public Notice that establishes the filing window for site registrations. Entities that wish to begin operations prior to the establishment of the site registration window may apply for temporary authority, on a non-interference basis, through the Commission's established procedures; the Commission expects that such authority will terminate prior to the initial site registration round. The Commission will elsewhere consider additional issues regarding potential changes in the unwanted emission limit for mobile stations in the Lower 37 GHz band, possible improvements in

the Phase One coordination process, and potential paths towards DSMS. Licensees that initiate service in the band will be subject to any future rule changes.

### E. Priority for Military Systems in the 37–37.2 GHz Band

40. *Background.* Although the Lower 37 GHz band will be a co-primary, shared use band among Federal and non-Federal users, the Commission is cognizant that military deployments are often on longer timescales than commercial deployments, and consequently that these military deployments may require priority access to ensure they are not precluded from accessing the band. At the same time, the Commission recognizes that non-Federal deployment under certain conditions may be necessary to prevent any such priority access spectrum from being underutilized. As such, the *2024 Public Notice* sought input on implementing priority access for the DoD and military agencies in the lower 200 megahertz portion of the band (37–37.2 GHz) and sought input on the conditions under which non-Federal users could operate in this portion of the band while maintaining flexibility for military deployments Specifically, the *2024 Public Notice* sought input on allowing non-Federal users to register and deploy sites in the 37–37.2 GHz portion of the band immediately, subject to the conditions that they modify or cease operations in the future if those operations conflict with subsequent military deployments—and that non-Federal operators would not be protected from harmful interference from subsequent military deployments.

41. No commenters in response to the *2024 Public Notice* oppose reserving the lower 200 megahertz of the band for priority access for the DoD and military agencies, so long as the Commission allow non-Federal operations in the lower 200 megahertz segment in areas where DoD is not using the spectrum. Ericsson, however, urges the Commission to limit Federal priority access to outdoor operations only, arguing that the anticipated non-Federal indoor operations use cases are unlikely to

pose interference to Federal operations and should be coordinated and protected on a first-come, first-served basis. NCTA argues that under its alternative coordination mechanism priority access would not be necessary. If, however, the Commission was to adopt the proposed two-phase coordination mechanism, NCTA acknowledges that priority access may be reasonable. All commenters oppose the lower 200 megahertz being set aside *exclusively* for military operations, instead preferring that non-Federal operations be permitted to operate in the lower portion of the band subject to the condition that they modify or potentially cease operations if the non-Federal operations conflict with military operations that are subsequently deployed.

42. *Discussion.* The Commission adopts priority access for Federal military operations in the 37–37.2 GHz sub-band. The Commission believes that establishing priority access strikes the right balance between enabling military operations to deploy in the band despite having longer timescales than non-Federal operations and permitting non-Federal operations to make the most efficient use of the spectrum. Non-Federal operators can register and deploy sites immediately in the lower 200 megahertz, but must modify or cease operations in the future if those operations conflict with subsequent military operations, and non-Federal operators will not be protected from harmful interference from subsequent military deployments in this portion of the band. The Commission rejects Ericsson's suggestion to limit priority access to outdoor operations on the grounds that, as discussed above, the Commission is not excepting indoor operations.

43. In the DoD/NTIA Report, DoD and NTIA describe when and how they would invoke priority access and the anticipated process for resolving potential interference concerns. DoD and NTIA envision invoking priority access when the incoming military operations' Phase One conduit's overlap with deployed non-Federal operations in the 37–37.2 GHz portion of the band. Once priority access is invoked,

DoD and NTIA recommend that DoD would subsequently work in good faith with the non-Federal operator over a set time period (i.e., 30 days) to resolve the interference concerns. In that regard, the DoD/NTIA Report recommends that the [non-Federal] operator either modify its service to be consistent with DoD operations or shut down if coexistence is not possible. Upon notification that DoD is beginning construction of its facilities, the non-Federal operator must modify or cease any overlapping operations. One of the rules adopted in this item imposes that requirement. DoD and NTIA support a limited transition period of compliance for non-Federal incumbents following this notification. The decision whether to allow a transition period in a particular case is within the discretion of DoD.

### F. Construction Requirements

44. *Background.* To prevent warehousing of spectrum and to promote rapid deployment of new technologies and services to the benefit of consumers, the Commission adopts buildout requirements as discussed below. In the *2024 Public Notice*, WTB sought input on adopting buildout requirements that would require non-Federal operators to finish construction and begin operation within 120 days of the date the site registration is granted, or the registration would be cancelled, and the licensee would forfeit its interference protection priority.

45. Two commenters to the *2024 Public Notice* address the Commission's 120-day buildout proposal. NCTA cautions that finishing construction within 120 days will be onerous in many circumstances, while Verizon argues that Federal and non-Federal operators should be subject to the same 120-day buildout deadline to ensure that both deploy promptly and make efficient use of the band. In the DoD/NTIA Report, DoD and NTIA contend that a disparity between Federal and non-Federal operators' buildout requirements is appropriate "in order to account for Congressional

appropriations and acquisitions timelines that are typical of Federal operations." They further indicate that "NTIA intends to target Federal operations to complete construction and begin operations within 24-months of clearing a proposed site through the coordination process."

46. *Discussion.* The Commission adopts a two-phase construction requirement, which consists of an accelerated timeframe for the initial site registration round and a different timeframe for subsequent site registrations. As explained below, in the initial site registration round the Commission adopts an accelerated buildout deadline of 120 days from when the registration is granted to combat the heightened risk among early entrants of speculative registrations, spectrum warehousing, and the possibility of crowding out later entrants. An operator that registers its site after the initial site registration round must construct and start its registered operations within 12 months of the date the registration is granted for that site. Although NTIA indicates that it is targeting a 24-month buildout deadline for Federal operators, and Verizon argues that Federal and non-Federal operators should be subject to the same buildout requirements, the Commission declines to adopt a 24-month deadline for non-Federal operators merely for the sake of uniformity. The Commission believes that its twin goals of preventing spectrum warehousing and promoting widespread deployment are best met by applying the more stringent 12-month buildout deadline for non-Federal operators. The buildout clock will start as soon as a registration is granted in the Universal Licensing System (ULS). Although first-in-time rights will be afforded once a site is successfully coordinated and registered, they will be lost if facilities are not built out. Failure to meet the construction deadline will result in the forfeiture of first-in-time protection and result in automatic termination of the registration. The licensee will also be prohibited from filing new site registration applications for that site (or any site whose interference contour would overlap with the interference contour for the terminated

registration) for 12 months from the date the registration automatically terminated (i.e., a period of 12 months after the construction deadline).

### G. Initial Site Registration Round

47. *Background.* Due to the limited number of channels in the Lower 37 GHz band, the variety of anticipated use cases, and the fact that both Federal and non-Federal operators can deploy in the band, initial demand for the band may exceed the available supply of channels in some areas. There is a risk that operators may be incentivized to file a large number of registrations as soon as site registration becomes available. In order to avoid speculative registrations and to ensure future entrants are not precluded from accessing the band, the *2024 Public Notice* sought input on applying special rules to the initial site registration round. Specifically, the *2024 Public Notice* sought input on limiting applicants to a single 100-megahertz channel per site, establishing accelerated buildout deadlines (e.g., 60 or 90 days), and reserving the right for the Commission to grant an applicant a different 100-megahertz channel in the event that multiple applicants seek to register the same channel.

48. All commenters addressing the issue oppose limiting applicants in the initial site registration round to a single 100-megahertz channel. Starry and INCOMPAS argue that they require at least 200 megahertz of spectrum to provide quality service. NCTA, Federated Wireless, and Joint Commenters, on the other hand, argue that applicants should be permitted to register multiple 100-megahertz channels per site, but only the first 100-megahertz channel should receive first-in-time prioritization. NCTA explains that limiting operators to a single 100-megahertz channel is "inefficient and will leave channels in many areas unused." Joint Commenters adds that spectrum should be put to use in the present rather than reserved for some unknown future user and that Federal access to the band in the future is already preserved through priority access

rules. INCOMPAS suggests a similar arrangement where an applicant would be permitted to register multiple 200-megahertz channels per site, but only the first 200-megahertz channel would receive first-in-time prioritization.

49. With respect to an accelerated buildout deadline in the initial site registration round, Starry supports establishing such a time period, while NCTA does not. Starry suggests, however, that a window longer than 90 days is necessary. NCTA argues that a shorter deadline than the proposed 120-day buildout deadline should not be necessary in the initial site registration round, particularly if applicants are entitled to first-in-time priority only in a single channel. Verizon urges that any accelerated deadlines should apply to both Federal and non-Federal operations to ensure all operators deploy promptly and do not delay construction. Lastly, regarding the Commission reserving the right to grant a channel different than the one the applicant requested, Verizon agrees that the Commission should reserve the right to do so, particularly if it facilitates spectrum contiguity while CTIA asks for additional detail around how the Commission would resolve situations where mutually exclusive applications are filed simultaneously beyond offering an alternate 100-megahertz channel and what the Commission would do if there is not an alternate channel available.

50. *Discussion*. In order to better facilitate access to the band in the initial site registration round, the Commission adopts a 200-megahertz (two 100-megahertz channels) limit per site and an accelerated buildout deadline of 120 days. The Commission declines to adopt the approach suggested by NCTA, Federated Wireless, Joint Commenters, and INCOMPAS in response to the *2024 Public Notice* (wherein operators would be permitted to register multiple channels, but only the first registered channel would receive first-in-time protections). The Commission finds that assigning different rights to channels in the initial site registration round will unnecessarily

complicate the registration and coordination process. Moreover, permitting operators to register up to 200 megahertz of spectrum as opposed to 100 megahertz should facilitate the ability of applicants to acquire sufficient spectrum to deploy their operations while ensuring the spectrum is put to use to protect later entrants' access to the band. Further, in order to streamline the process, in the initial site registration round. The Commission will process applications in sequence based on the time stamp indicating when the application was filed, and will consider applications only for the specific frequency requested. Giving first-in-time rights to the earlier-filed applications will prevent any mutual exclusivity concerns, such as those raised by CTIA. The Commission also declines to extend the initial site registration round buildout deadline beyond 120 days because if operators cannot meet the stringent initial buildout deadline, they can register their sites after the initial site registration round. The accelerated buildout deadline is designed to limit the initial number of registrations and prevent spectrum warehousing by ensuring only operators who are ready to construct and commence operations right away are incentivized to register a site. Finally, the Commission reserves the right to assign a different channel to an applicant than the channel requested in the application. The Commission agrees with Verizon that allowing such a change could facilitate the benefits of spectrum contiguity.

### H. Secondary Market Rules

51. In the *2016 FNPRM*, the Commission sought comment on whether and how to apply secondary market rules, such as leasing, partitioning, and disaggregation, to the Lower 37 GHz band. In response, Starry argues that secondary market rules would preserve competition and availability of spectrum. 5G Americas supports adopting the rules on the grounds that they could yield market-based finer-granularity sharing that would make more intensive use of the spectrum while not adding to the complexity of the sharing scheme.

52. Notwithstanding the *2016 FNPRM* comments, the Commission declines to adopt secondary market rules for the Lower 37 GHz band. Initially, since the Commission is using site-based registrations, as opposed to geographic area licensing, partitioning and disaggregation would not apply. With respect to leasing, the lower 37 GHz framework—specifically, the nationwide, non-exclusive licensing approach and the Phase One/Phase Two coordination and site registration approach—provides licensees with optimal flexibility and no barriers to entry, thereby negating the need for leasing. Moreover, the 70/80/90 GHz band, which shares a similar framework with the Lower 37 GHz band insofar as both employ non-exclusive licenses and require coordination and site registration, does not include secondary market rules for similar reasons.

## IV. FINAL REGULATORY FLEXIBILITY ANALYSIS

53. As required by the RFA, the Commission incorporated an Initial Regulatory Flexibility Analysis (IRFA) in the *2018 FNPRM*. The Commission sought written public comment on the proposals in the *2018 FNPRM*, including comments on the IRFA. No comments were filed addressing the IRFA. The FRFA incorporated in this item conforms to the RFA, and is summarized below.

### A. Need for, and Objectives of, the Report and Order and Sixth Report and Order

54. In the *Report and Order and Sixth Report and Order*, the Commission establishes a licensing framework that creates an innovative shared space that can be used by a wide variety of Federal and non-Federal users, by both new entrants and by established operators – smaller businesses in particular – to experiment with new technologies in millimeter wave frequencies located in the 37-37.6 GHz band (Lower 37 GHz band). Specifically, the Commission adopts a licensing and registration framework that creates a two-step process under which a non-Federal entity first obtains a

nationwide non-exclusive license and then registers site-specific locations, with first-in-time interference protection rights provisionally afforded upon completed coordination and perfected upon construction.

55. Under this framework, priority access is given for military use of the 37.0 to 37.2 GHz segment of the band. For the 37.2-37.6 GHz segment, the Commission adopts rules that give both Federal and non-Federal entities equal access, except that Federal users have priority access in the 18 zones designated in the Commission's rules.

56. In the first step of the two-step process, a potential commercial licensee must apply for a nationwide nonexclusive license by submitting an application in the Commission's licensing database, the ULS. Once the application has been accepted for filing, it is placed on public notice. Once the license has been granted, the licensee coordinates its proposed operations by submitting a valid coordination notice to all licensees with operations whose interference contour overlap with their proposed interference contour, and responses are due within 15 days of submitting the coordination notice. Non-Federal licensees are permitted, but not required, to use a third-party coordinator to complete this task. Only after the site-specific location has been successfully coordinated, is the licensee authorized to complete the second step of the process: registering site-specific location pursuant to procedures to be established by WTB.

57. The Commission also adopts two different construction deadlines depending on when the licensee registered its site-specific location. Licensees that register their site-specific locations during the "initial phase" must complete construction within 120 days of the registration date for that site-specific location. Licensees that

register their site-specific locations after the “initial phase” must complete construction with 12 months of the date of the registration date for that site-specific location.

58. Because the military has been given priority in the 37.0-37.2 GHz band, first-in-time rights are accorded to non-Federal licensees that are operating in the 37.2-37.6 GHz segment. First-in-time rights are provisionally accorded to the non-Federal licensee that submits a valid coordination notice, but only if that licensee registers the site, and then also timely constructs the site-specific location. If the licensee does not meet the applicable coordination and construction deadlines for a site-specific location, the licensee loses its first-in-time status, the site-specific location is deregistered, and the licensee must wait 12 months before it may file and any new applications for new site-registrations.

59. As mentioned above, the Commission has given the military priority access to the 37.0-37.2 GHz band. Should a non-Federal licensee wish to deploy operations in the 37.0-37.2 GHz band, in addition to meeting the requirements applicable to all non-Federal licensees in this band, it must query the NTIA’s database to determine whether there are prior Federal operations. If it receives a “green light” it is authorized to deploy operations. If it receives a “yellow light” it may negotiate with NTIA and the military, but the military is not obligated to accommodate the non-Federal licensee’s operations in the 37.0-37.2 GHz band.

60. Also as mentioned above, both Federal and non-Federal entities have equal access to the 37.2-37.6 GHz segment of the band. In this segment, non-Federal licensees must, in addition to complying with the requirements applicable to all non-Federal licensees in this band, query NTIA’s database to determine whether there are prior Federal operations. If it receives a “green light” it may deploy operations. If it receives a “yellow light” it must negotiate with the military before it is authorized to

deploy operations. But since both Federal and non-Federal entities have equal access to the 37.2-37.6 GHz segment, Federal entities seeking to deploy operations in the 37.2-37.6 GHz segment must, in turn, query the record of non-Federal site registrations. A first-in-time non-Federal licensee operating in the Top 100 Partial Economic Areas (PEAs) must use "good faith" efforts to accommodate subsequent Federal operations. A "first-in-time" licensee operating outside the Top 100 PEAs must use all "reasonable efforts" to accommodate subsequent Federal operations.

61. The rules adopted in the *Report and Order and Sixth Report and Order* further the Commission's objectives of providing mmW spectrum to providers through efficient spectrum sharing with fewer regulatory hurdles. In addition, making this spectrum available to providers will ensure the availability of a wide variety of innovative products and services to the American public, and allow small and other entities to grow their businesses.

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

62. No comments were filed addressing the impact of the proposed rules on small entities.

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

63. 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 provide a detailed statement of any change made to the proposed rules as a result of those comments. 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

64. 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 rules adopted herein. The RFA generally defines the term "small entity" as having the same meaning as the same term established in the Small Business Act. In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act. 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 SBA.

65. *Small Businesses, Small Organizations, Small Governmental Jurisdictions*. The Commission's actions, over time, may affect small entities that are not easily categorized at present. The Commission therefore describes, at the outset, three broad groups of small entities that could be directly affected herein. 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. These types of small businesses represent 99.9% of all businesses in the United States, which translates to 34.75 million businesses. 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." 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. Nationwide, for tax year 2022, there were approximately 530,109 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.

66. 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.” U.S. Census Bureau data from the 2022 Census of Governments indicate there were 90,837 local governmental jurisdictions consisting of general purpose governments and special purpose governments in the United States. Of this number, there were 36,845 general purpose governments (county, municipal, and town or township) with populations of less than 50,000 and 11,879 special purpose governments (independent school districts) with enrollment populations of less than 50,000. Accordingly, based on the 2022 U.S. Census of Governments data, the Commission estimate that at least 48,724 entities fall into the category of “small governmental jurisdictions.”

67. *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. The SBA size standard for this industry classifies a business as small if it has 1,500 or fewer employees. U.S. Census Bureau data for 2017 show that there were 2,893 firms in this industry that operated for the entire year. Of that number, 2,837 firms employed fewer than 250 employees. Additionally, based on Commission data in the 2022 Universal Service Monitoring Report, as of December 31, 2021, there were 594 providers that reported they were engaged in the provision of wireless services. Of these providers, the Commission estimates that 511 providers have 1,500 or fewer employees. Consequently, using the SBA’s small business size standard, most of these providers can be considered small entities.

68. *Fixed Microwave Services.* Fixed microwave services include common carrier, private-operational fixed, and broadcast auxiliary radio services. They also include the Upper Microwave Flexible Use Service (UMFUS), Millimeter Wave Service (70/80/90 GHz), Local Multipoint Distribution Service (LMDS), the Digital Electronic Message Service (DEMS), 24 GHz Service, Multiple Address Systems (MAS), and Multichannel Video Distribution and Data Service (MVDDS), where in some bands licensees can choose between common carrier and non-common carrier status. Wireless Telecommunications Carriers (except Satellite) is the closest industry with an SBA small business size standard applicable to these services. The SBA small size standard for this industry classifies a business as small if it has 1,500 or fewer employees. U.S. Census Bureau data for 2017 show that there were 2,893 firms that operated in this industry for the entire year. Of this number, 2,837 firms employed fewer than 250 employees. Thus, under the SBA size standard, the Commission estimates that a majority of fixed microwave service licensees can be considered small.

69. The Commission's small business size standards with respect to fixed microwave services involve eligibility for bidding credits in the auction of spectrum licenses for the various frequency bands included in fixed microwave services. When bidding credits are adopted for the auction of licenses in fixed microwave services frequency bands, such credits may be available to several types of small businesses based average gross revenues (small, very small and entrepreneur) pursuant to the competitive bidding rules adopted in conjunction with the requirements for the auction and/or as identified in part 101 of the Commission's rules for the specific fixed microwave services frequency bands.

70. In frequency bands where licenses were assigned by auction, the Commission notes that as a general matter, the number of winning bidders that qualify as small businesses at the close of an auction does not necessarily represent the

number of small businesses currently in service. Further, the Commission does not generally track subsequent business size unless, in the context of assignments or transfers, unjust enrichment issues are implicated. Additionally, since the Commission does not collect data on the number of employees for licensees providing these services, at this time the Commission is not able to estimate the number of licensees with active licenses that would qualify as small under the SBA's small business size standard.

71. *Satellite Telecommunications.* This industry comprises firms "primarily engaged in providing telecommunications services to other establishments in the telecommunications and broadcasting industries by forwarding and receiving communications signals via a system of satellites or reselling satellite telecommunications." Satellite telecommunications service providers include satellite and earth station operators. The SBA small business size standard for this industry classifies a business with $44 million or less in annual receipts as small. U.S. Census Bureau data for 2017 show that 275 firms in this industry operated for the entire year. Of this number, 242 firms had revenue of less than $25 million. Consequently, using the SBA's small business size standard most satellite telecommunications service providers can be considered small entities. The Commission notes however, that the SBA's revenue small business size standard is applicable to a broad scope of satellite telecommunications providers included in the U.S. Census Bureau's Satellite Telecommunications industry definition. Additionally, the Commission neither requests nor collects annual revenue information from satellite telecommunications providers, and is therefore unable to more accurately estimate the number of satellite telecommunications providers that would be classified as a small business under the SBA size standard.

72. *All Other Telecommunications*. This industry is comprised of establishments primarily engaged in providing specialized telecommunications services, such as satellite tracking, communications telemetry, and radar station operation. This industry also includes establishments primarily engaged in providing satellite terminal stations and associated facilities connected with one or more terrestrial systems and capable of transmitting telecommunications to, and receiving telecommunications from, satellite systems. Providers of Internet services (e.g., dial-up ISPs) or Voice over Internet Protocol (VoIP) services, via client-supplied telecommunications connections are also included in this industry. The SBA small business size standard for this industry classifies firms with annual receipts of $40 million or less as small. U.S. Census Bureau data for 2017 show that there were 1,079 firms in this industry that operated for the entire year. Of those firms, 1,039 had revenue of less than $25 million. Based on this data, the Commission estimates that the majority of "All Other Telecommunications" firms can be considered small.

73. *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. 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. The SBA small business size standard for this industry classifies businesses having 1,250 employees or less as small. U.S. Census Bureau data for 2017 show that there were 656 firms in this industry that operated for the entire year. Of this number, 624 firms had fewer than 250 employees. Thus, under the SBA size standard, the majority of firms in this industry can be considered small.

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

74. The RFA directs agencies to describe the economic impact of proposed rules on small entities, as well as projected reporting, recordkeeping and other compliance requirements, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record.

75. The Commission expects the rules adopted in the *Report and Order and Sixth Report and Order* will impose new or additional reporting or recordkeeping and/or other compliance obligations on small entities. Further, the Commission also anticipates that the filing, recordkeeping and reporting requirements associated with the requirements of the adopted rules will require small businesses as well as other entities that intend to utilize the Lower 37 GHz band to use professional, accounting, engineering or survey services in order to meet these requirements. However, the adopted rule revisions should benefit small entities and by giving them additional information, greater flexibility, and more options for gaining access to wireless spectrum. In addition, the comments in the record does not reflect concerns by small entities regarding compliance cost, nor do they contain cost estimates for compliance. As a result, the Commission cannot, at this time, determine the cost of compliance for small entities.

76. In order to comply with the adopted rules, small entities and other applicants for Lower 37 GHz licenses and registrations will be required to file license applications using the Commission's automated ULS. ULS is an online electronic filing system that also serves as a powerful information tool, one that enables potential

licensees to research applications, licenses, and antenna structures. It also keeps the public informed with weekly public notices, Commission rulemakings, processing utilities, and a telecommunications glossary. Site registrations will be filed pursuant to procedures to be established by WTB.

77. In addition, small entities and other licensees seeking to register sites in the Lower 37 GHz band will be required to coordinate their proposed operations with pre-existing non-Federal and Federal operations. Such coordination will be necessary in order to prevent interference. The coordination process gives licensees the ability to analyze and work out potential interference issues based on the nature of the systems involved. Furthermore, by requiring potential interference conflicts are worked out prior to the filing of registrations with the Commission, these procedures will minimize compliance burdens on both licensees and the Commission.

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

78. The RFA requires an agency to provide, "a description of the steps the agency has taken to minimize the significant economic impact on small entities . . . including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule and why each one of the other significant alternatives to the rule considered by the agency which affect the impact on small entities was rejected."

79. The Commission does not believe that its adopted changes will have a significant economic impact on small entities. However, in reaching this conclusion, the Commission has nevertheless taken steps to minimize potential significant economic impact on small entities and also considered alternative possibilities. For example, the rules the Commission adopts herein facilitate spectrum sharing by multiple entities and

remove unnecessary barriers to accessing spectrum. Additionally, the Commission considered and rejected adopting geographic area licensing in this band. While the Commission have taken the potential concerns of small entities into account, the Commission note that these costs are necessary to effectuate the purpose of the Communications Act—namely, to further the efficient use of spectrum and to prevent spectrum warehousing. Likewise, compliance with The Commission's service and technical rules and coordination requirements are necessary for the furtherance of its goals of protecting the public while also providing interference free services. Moreover, while small and large businesses must equally comply with these rules and requirements, the Commission has taken the steps described below to help alleviate the burden on small businesses that seek to comply with these requirements. To the extent practicable, the Commission is using existing systems and processes that small businesses should be familiar with, thereby making it easier for them to access Lower 37 GHz band spectrum and minimizing their costs. Also, when filing nationwide non-exclusive licenses, licensees will use ULS, which is used for virtually all wireless authorizations.

## V. ORDERING CLAUSES

80. Accordingly, IT IS ORDERED, pursuant to sections 4(i), 301, 302, 303(r), 308, 309, and 333 of the Communications Act of 1934, 47 U.S.C. 154(i), 301, 302a, 303(r), 308, 309, 333, that the *Report and Order, Sixth Report and Order* IS HEREBY ADOPTED.

81. IT IS FURTHER ORDERED that parts 1 and 30 of the Commission's rules ARE AMENDED as specified in Final Rules and such rule amendments WILL BECOME EFFECTIVE 30 days after the date of publication in the *Federal Register*. Sections 30.501 and 30.503 contain new or modified information-collection requirements that

require review by the OMB under the PRA. The Commission directs WTB to announce the compliance date for those information collections in a document published in the *Federal Register* after OMB approval.

82. IT IS FURTHER ORDERED that the Office of the Secretary SHALL SEND a copy of the *Report and Order and Sixth Report and Order*, including the FRFA, to the Chief Counsel for Advocacy of the Small Business Administration.

83. IT IS FURTHER ORDERED that the Office of the Managing Director, Performance Program Management, SHALL SEND a copy of the *Report and Order and Sixth Report and Order* in a report to be sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act, 5 U.S.C. 801(a)(1)(A).

**List of Subjects**

**47 CFR Part 1**

Administrative practice and procedure, Claims.

**47 CFR Part 30**

Communications equipment, Communications common carriers.

Federal Communications Commission.

**Marlene Dortch**

*Secretary,*

*Office of the Secretary.*

## Final Rules

For the reasons discussed in the preamble, the Federal Communications Commission amends 47 CFR parts 1 and 30 as follows:

## PART 1—PRACTICE AND PROCEDURE

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

**Authority:** 47 U.S.C. chs. 2, 5, 9, 13; 28 U.S.C. 2461 note; 47 U.S.C. 1754, unless otherwise noted.

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

### § 1.907 Definitions.

* * * * *

*Covered geographic licenses*. Covered geographic licenses consist of the following services: 1.4 GHz Service (part 27, subpart I, of this chapter); 1.6 GHz Service (part 27, subpart J); 24 GHz Service and Digital Electronic Message Services (part 101, subpart G, of this chapter); 218-219 MHz Service (part 95, subpart F, of this chapter); 220-222 MHz Service, excluding public safety licenses (part 90, subpart T, of this chapter); 600 MHz Service (part 27, subpart N); 700 MHz Commercial Services (part 27, subparts F and H); 700 MHz Guard Band Service (part 27, subpart G); 800 MHz Specialized Mobile Radio Service (part 90, subpart S); 900 MHz Specialized Mobile Radio Service (part 90, subpart S); 900 MHz Broadband Service (part 27, subpart P); 3.45 GHz Service (part 27, subpart Q); 3.7 GHz Service (part 27, subpart O); Advanced Wireless Services (part 27, subparts K and L); Air-Ground Radiotelephone Service (Commercial Aviation) (part 22, subpart G, of this chapter); Broadband Personal Communications Service (part 24, subpart E, of this

chapter); Broadband Radio Service (part 27, subpart M); Cellular Radiotelephone Service (part 22, subpart H); Citizens Broadband Radio Service (part 96, subpart C, of this chapter);Intelligent Transportation Systems Radio Service in the 5895-5925 MHz band, excluding public safety licenses (part 90, subpart M); Educational Broadband Service (part 27, subpart M); H Block Service (part 27, subpart K); Local Multipoint Distribution Service (part 101, subpart L); Multichannel Video Distribution and Data Service (part 101, subpart P); Multilateration Location and Monitoring Service (part 90, subpart M); Multiple Address Systems (EAs) (part 101, subpart O); Narrowband Personal Communications Service (part 24, subpart D); Paging and Radiotelephone Service (part 22, subpart E; part 90, subpart P); VHF Public Coast Stations, including Automated Maritime Telecommunications Systems (part 80, subpart J, of this chapter); Space Launch Services (part 26 of this chapter); Upper Microwave Flexible Use Service, except for the 37-37.6 GHz band (part 30 of this chapter); and Wireless Communications Service (part 27, subpart D).

* * * * *

3. Amend § 1.9005 by revising paragraph (ll) to read as follows:

**§ 1.9005 Included services.**

* * * * *

(ll) The Upper Microwave Flexible Use Service, except for the 37-37.6 GHz band (part 30 of this chapter);

* * * * *

**PART 30—UPPER MICROWAVE FLEXIBLE USE SERVICE**

4. The authority citation for part 30 continues to read as follows:

**Authority:** 47 U.S.C. 151, 152, 153, 154, 301, 303, 304, 307, 309, 310, 316, 332, 1302, unless otherwise noted.

5. Amend § 30.2 by adding, in alphabetical order, the definitions of “Lower 37 GHz band” and “Upper 37 GHz band” to read as follows:

**§ 30.2 Definitions.**

* * * * *

*Lower 37 GHz band.* The frequency range 37-37.6 GHz.

* * * * *

*Upper 37 GHz band.* The frequency range 37.6-38.6 GHz.

6. Amend § 30.4 by revising paragraph (f) to read as follows:

**§ 30.4 Frequencies.**

* * * * *

(f) 37-38.6 GHz band: This band is divided into the Lower 37 GHz band and the Upper 37 GHz band. Lower 37 GHz band channels: 37,000-37,100 MHz, 37,100-37,200 MHz, 37,200-37,300 MHz, 37, 300-37,400 MHz, 37,400-37,500 MHz, 37,500-37,600 MHz. The 37,000-37,600 MHz band segment shall be available on a site-specific, coordinated shared basis with eligible Federal entities. Upper 37 GHz band channels: 37,600-37,700; 37,700-37,800 MHz; 37,800-37,900 MHz; 37,900-38,000 MHz; 38,000-38,100 MHz; 38,100-38,200 MHz; 38,200-38,300 MHz; 38,300-38,400 MHz; 38,400-38,500 MHz, and 38,500-38,600 MHz.

* * * * *

7. Revise § 30.7 to read as follows:

**§ 30.7 Lower 37 GHz band—Shared coordinated service.**

For licensing and operational rules applicable to the Lower 37 GHz Band, see subpart F of this part. Unless otherwise noted, the technical standards in subpart C of this part shall apply to the Lower 37 GHz band.

8. Amend § 30.104 by revising paragraph (a) and adding paragraph (g) to read as follows:

**§ 30.104 Performance requirements.**

(a) Upper Microwave Flexible Use Service licensees, except for Lower 37 GHz band licensees, must make a buildout showing as part of their renewal applications. Licensees relying on mobile or point-to-multipoint service must show that they are providing reliable signal coverage and service to at least 40 percent of the population within the service area of the licensee, and that they are using facilities to provide service in that area either to customers or for internal use. Licensees relying on point-to-point service must demonstrate that they have four 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. If the population within the license area is greater than 268,000, a licensee relying on point-to-point service must demonstrate it has at least one link in operation and is providing service for each 67,000 population within the license area. In order to be eligible to be counted under the point-to-point buildout standard, a point-to-point link must operate with a transmit power greater than +43 dBm. Lower 37 GHz band licensees shall comply with the requirements in paragraph (g) of this section.

* * * * *

(g) Except as noted in § 30.507(c), Lower 37 GHz band licensees must construct their registered operations and begin providing service within 12 months of the date the site registration is granted. Failure to meet this requirement will result in deletion of the registration from the license, and the licensee will be ineligible to register facilities at that site for a period of 12 months after the construction deadline.

9. Amend § 30.204 by revising paragraphs (a) and (b)(2) to read as follows:

**§ 30.204 Field strength limits.**

(a) *Base/mobile operations.* The predicted or measured Power Flux Density (PFD) from any Base Station operating in the 27.5-28.35 GHz band, 37.6-38.6 GHz band, and 38.6-40 GHz bands at any location on the geographical border of a licensee's service area shall not exceed −77.6 dBm/$m^2$/MHz (measured at 1.5 meters above ground) unless the adjacent affected service area licensee(s) agree(s) to a different PFD.

(b) * * *

(2) Prior to operating a fixed point-to-point transmitting facility in the 37,600-40,000 MHz band where the facilities are located within 16 kilometers of the boundary of the licensees authorized market area, the licensee must complete frequency coordination in accordance with the procedures specified in § 101.103(d)(2) of this chapter with respect to neighboring licensees that may be affected by its operations.

10. Add subpart F, consisting of §§ 30.501 through 30.505, to read as follows:

**Subpart F—Lower 37 GHz Band**

Sec.

**§ 30.501 [Reserved]**

**§ 30.502 Site registration.**

Point to-point links and base stations must be registered in the pursuant to procedures to be established by the Wireless Telecommunications Bureau prior to operation. Prior to filing a site registration, a licensee must successfully coordinate with the relevant co-channel Federal and non-Federal licensees. Site registrations will be processed in order of receipt unless a later filed registrant provides evidence that it completed coordination prior to the other registrant.

**§ 30.503 [Reserved]**

**§ 30.504 Military priority on 37-37.2 GHz.**

(a) Federal military operations have priority in the 37-37.2 GHz band (priority access). Non-Federal licensees can register and deploy sites in the 37-37.2 GHz band, but must modify or cease operations in the future if those operations conflict with later-deployed military operations. A licensee's operations in this band will not be protected from harmful interference from subsequent military deployments.

(b) If a licensee is notified that its operations conflict with incoming military operations and priority access has been invoked, the licensee must work with the Federal military operator in good faith to either modify service to be consistent so it does not

conflict with the military operations or cease operations if coexistence is not possible.

**§ 30.505 Special rules applicable to initial registration round.**

(a) After giving licensees an opportunity to obtain nationwide non-exclusive licenses, the Wireless Telecommunications Bureau shall, by public notice, establish procedures for licensees to file an initial set of site registrations (the initial site registration round).

(b) In the initial site registration round, licensees may register a maximum of two 100-megahertz channels at any given site.

(c) Sites registered in the initial registration round must be constructed and providing service within 120 days of the site registration being granted.

(d) If multiple site registrations with overlapping Phase One contours are filed during the initial site registration round, the Wireless Telecommunications Bureau will grant the earlier filed registration (based on the Universal Licensing System's time stamp). Both licensees shall then engage in Phase Two coordination with respect to the later-filed registration. The licensee with the later-filed registration may amend its application to facilitate coexistence with the other licensee so long as the amendment does not conflict with any other site registration filed during the initial window or with any existing or proposed Federal operations. If Phase Two coordination is successful, the later-filed registration will be successful. If, after good faith discussions and efforts to accommodate the later-filed registration, Phase Two coordination is not successful, the later-filed registration will be dismissed.

11. Delayed indefinitely, add § 30.501 to read as follows:

**§ 30.501 Nationwide non-exclusive licensing.**

The Lower 37 GHz band is licensed on the basis of non-exclusive nationwide licenses. There is no limit to the number of non-exclusive nationwide licenses that may be granted for this band, and these licenses will serve as a prerequisite for registering individual point-to-point links and base stations.

12. Delayed indefinitely, add § 30.503 to read as follows:

**§ 30.503 Coordination of operations.**

(a) *Coordination process.* Coordination of operations in the Lower 37 GHz band involves two phases. In the first phase, a licensee draws a coordination contour around its proposed operations. If the licensee's coordination contour does not overlap with the coordination contour of existing or proposed co-channel Federal and non-Federal systems, the licensee may proceed to register its site. If there is overlap with the coordination contour of one or more existing or proposed co-channel Federal and non-Federal systems, coordination proceeds to the second phase, in which operators work directly with each other to determine whether their systems are compatible.

(b) *Phase One*--(1) *Drawing of coordination contour.* The coordination contour is the contour around the base or fixed station where the power spectral density threshold (PSDT) equals -110 dBm/100MHz. In order to calculate the power spectral density threshold, an applicant must provide the Equivalent Isotropic Radiated Power (EIRP) (expressed in dBm/100 MHz), and the latitude and longitude of the base station (expressed in decimal degrees). The Irregular Terrain Model (ITM) using parameters listed in table 2 to paragraph (b)(2) of this section and ITU-R Recommendation P.676 using parameters listed in table 3 to paragraph (b)(2) of this section should be used to calculate the distance from the base or fixed station to the coordination contour. Clutter loss should not be considered.

(i) *Point-to-multipoint operations.* Applicants should draw the coordination contour distance at each radial corresponding to Required Propagation Loss ( $L_{Required}$), where $L_{Required}$ = EIRP – PSDT. For purposes of this calculation, the receiver antenna height of 10m should be assumed.

(ii) *Base-mobile operations.* Applicants should draw the coordination contour distance at each radial corresponding to Required Propagation Loss ($L_{Required}$), where $L_{Required}$ = EIRP – PSDT. For purposes of this calculation, the receiver height of 1.5m should be assumed.

(iii) *Point-to-point operations.* For each angular range relative to the main beam of the fixed station, applicants should draw the coordination contour distance at each radial corresponding to Required Propagation Loss ($L_{Required}$) as indicated in table 1 to this paragraph (b)(1)(iii). The applicant must provide the antenna height of both the transmitter and receiver fixed stations (in meters).

**Table 1 to Paragraph (b)(1)(iii)—Angular Range, Required Propagation Loss, and Antenna Discrimination Factor**

| Angular Range | Calculation of Required Propagation Loss | Calculation of Antenna Discrimination Factor (ADF) |
|---|---|---|
| within ±5° | $L_{Required}$ = EIRP – PSDT | |
| ±5° to ±15° | $L_{Required}$ = EIRP – ADF – PSDT | ADF increases linearly from 0 dB (at 5°) to 30 dB (at 15°) off-axis |
| ±15° to ±45° | $L_{Required}$ = EIRP – 30 dB – PSDT | |
| ±45° to ±55° | $L_{Required}$ = EIRP – ADF – PSDT | ADF increases linearly from 30 dB (at 45°) to 40 dB (at 55°) off-axis |
| ±55° to ±80° | $L_{Required}$ = EIRP – 40 dB – PSDT | |
| ±80° to ±100° | $L_{Required}$ = EIRP – ADF – PSDT | ADF increases linearly from 40 dB (at 80°) to 50 dB (at 100°) off-axis |
| Outside ±100° | $L_{Required}$ = EIRP – 50 dB – PSDT | |

(2) *Parameters to be used in generating Phase One contours.* The following parameters shall be used in generating Phase One contours:

**Table 2 to Paragraph (b)(2)—ITM Parameters to Be Used in Contour Zone Generation**

| Parameter | Value |
|---|---|
| Frequency | 37 GHz |
| Mode | Terrain Dependent |
| Transmitter Antenna Height (Above Ground Level) | Provided by Applicant (m) |
| Transmitter EIRP | Provided by Applicant (dBm/100 MHz) |
| Reference Receiver Antenna Height (Above Ground Level) | Point-to-Multipoint: 10 meters<br>Base-to-Mobile: 1.5 meters<br>Point-to-Point: Provided by Applicant (m) |
| Transmitter Location | Latitude (Decimal Degrees) and Longitude (Decimal Degrees) |
| Mode of Variability | Single Message |
| Surface Refractivity | 301 N-Units |
| Dielectric Constant of Ground | 15 |
| Radio Climate | Continental Temperate |
| Reliability | 50% |
| Confidence | 50% |
| Terrain Data | United States Geological Survey 1-Second |
| Atmospheric Attenuation | Recommendation ITU-R P.676 |
| Number of Radials | 360 (1 Degree Increments) |
| Spacing Along Radial | 30 meters |
| Distance Criteria | 1st point along radial where the required path loss is achieved |

**Table 3 to Paragraph (b)(2)—ITU-R P.676 Parameter Inputs**

| Parameter | Value |
|---|---|
| Frequency | 37 GHz |
| Air Temperature | 23 C |
| Surface Atmospheric Pressure | 1013.25 hPa |
| Ground-level Water Vapor Density | 7.5 g/m3 |

(c) *Phase Two*--(1) *Operator-to-operator coordination.* When the contour of a licensee's proposed operations overlaps with the existing or proposed contour of another licensee, there will be a second phase of coordination, in which operators would

communicate directly to discuss whether and under what circumstances a placement inside the relevant contours might be feasible.

(2) *Information exchange.* The applicant seeking to coordinate shall notify the incumbent operator and provide the information in table 1 to paragraph (b)(1)(iii) of this section concerning its proposed operations. Once that information is provided, the incumbent shall respond within 15 business days with the technical information in table 4 to this paragraph (c)(2) concerning its operations.

**Table 4 to paragraph (c)(2)—Information to Be Exchanged in Phase Two Coordination**

| Technical Parameter | Units | Comments |
|---|---|---|
| Transmitter Geographic Coordinates | Degrees/Minutes/Seconds | |
| Transmitter Antenna Ground Elevation | Meters | Above Mean Sea Level (as indicated by the U.S. Geological Survey (USGS) terrain database) |
| Transmitter Antenna Height | Meters | Above Ground Level |
| Transmitter Power | dBm | |
| Mainbeam Antenna Gain | dBi | |
| Equivalent Isotropic Radiated Power | dBm | |
| Center Frequency | MHz | |
| Emission Bandwidth | MHz | |
| Emission Designator | Emission Classification Symbols | |
| Emission Spectrum | Relative Attenuation (dB) as a Function of Frequency Offset from Center Frequency (MHz) | -3 dB, -20 dB, -60 dB points |
| Transmitter Antenna Azimuth of Maximum Gain | Degrees | With Respect to True North |
| Transmitter Antenna Downtilt/Uptilt (Elevation) Angle | Degrees | With Respect to Horizontal |
| Transmit Antenna Polarization | | |

| | | |
|---|---|---|
| Transmitter Azimuth Off-Axis Antenna Pattern | dBi as a function of off-axis angle in degrees | Required for all use cases; point-to-point systems should use National Spectrum Management Association (NSMA) Format |
| Transmitter Elevation Off-Axis Antenna Pattern | dBi as a function of off-axis angle in degrees | Required for all use cases; point-to-point systems should use NSMA Format |
| Transmitter Cable/Insertion Loss | dB | |
| Receiver Geographic Coordinates (Point-to-Point Systems Only) | Degrees/Minutes/Seconds | |
| Receiver Antenna Ground Elevation (Point-to-Point Systems Only) | Meters | Above Mean Sea Level (as indicated by the USGS terrain database) |
| Receiver Antenna Height (Point-to-Point Systems Only) | Meters | Above Ground Level |
| Receiver Mainbeam Antenna Gain | dBi | |
| Receiver Threshold/Sensitivity | dBm | Minimum Discernible Single/Criteria |
| Receiver Noise Figure | dB | |
| Receiver IF Selectivity | Relative Attenuation (dB) as a Function of Frequency Offset from Center Frequency (MHz) | -3 dB, -20 dB, -60 dB points |
| Receiver Antenna Azimuth of Maximum Gain | degrees | With Respect to True North |
| Receiver Antenna Downtilt/Uptilt (Elevation) Angle | degrees | With Respect to Horizontal |
| Receive Antenna Polarization | | |
| Receiver Azimuth Off-Axis Antenna Pattern | dBi as a function of off-axis angle in degrees | Required for all use cases; point-to-point systems should use NSMA Format |
| Receiver Elevation Off-Axis Antenna Pattern | dBi as a function of off-axis angle in degrees | Required for all use cases; point-to-point systems should use NSMA Format |
| Receiver Cable/Insertion Loss | dB | |

(3) *Phase Two coordination principles.* The following principles shall apply in Phase Two coordination:

(i) Parties shall negotiate and cooperate in good faith.

(ii) Parties are encouraged to use advanced interference mitigation techniques, such as antenna directivity, polarization, shielding, frequency selection, time division duplex (TDD) synchronization, or transmitter power control to provide solutions in specific situations.

(iii) Measured antenna patterns are preferred and should be used whenever available. In their absence, the operators may use modeled antenna patterns provided by the manufacturer, or a model that estimates the antenna pattern.

(iv) To calculate the propagation loss, Phase One technical assumptions of ITM and ITU-R P.676 are applicable. However, parties are also encouraged to mutually agree on proprietary propagation models, actual measurement data, or other environmental data, consistent with good engineering practices.

(v) To account for clutter loss, parties may consider ITU-R P.2108. However, parties are also encouraged to mutually agree on proprietary clutter loss models and building height databases, consistent with good engineering practices.

(vi) Both parties must agree on and accept the results of the analysis performed using the agreed-upon methodology. The Phase Two coordination analysis should not consider worst-case conditions unless justified.

(4) *Interference protection criteria.* Absent an agreement between the parties, the interference protection criteria for Phase Two is I/N = -6 dB, where:

(i) I (interference) is the received interference power at the input of the receiver, calculated with formula I = PT + GT + GR - LP – LT – LR –LC

– LA – LPol – FDR. PT is the transmitter power (dBm); GT is the transmitter antenna gain in the direction of the receiver (dBi); GR is the receiver antenna gain in the direction of the receiver (dBi); LP is the basic transmission loss, in the absence of clutter (dB); LT is the transmitter cable/insertion losses (dB); LR is the receiver cable/insertion losses (dB); LC is the clutter loss (dB); LA is the atmospheric loss (dB); LPol is the polarization loss (iB); and FDR is the Frequency Dependent Rejection (dB); and

(ii) N (noise) is the background noise level at receiver, calculated with formula N = -114 + 10 Log IFBW + NF. IFBW is the receiver 3 dB intermediate frequency bandwidth, in megahertz. If not available, the emission bandwidth may be used. NF is the receiver noise figure, in dB. The noise temperature is assumed to be 290 degrees Kelvin (room temperature) for all systems using this band.

(iii) The compatibility analysis only considers single-entry interference. If operators mutually agree to do so, they may consider aggregate interference.

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